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IN THIS ISSUE

ARTICLES

Hard-Facing in an Oil Refinery 41
G. W. NIGH

Aids to Aluminum Spot Welding 44
NORMAN GRANDE

Good Welds in a Hurry 46
ARTHUR HAVENS

Better Jobs from Flame-Cutting—II 48
A. F. CHOUINARD

Disabled Veterans Make Good 51
CAROLINE VAUGHAN

Welding Exposition in Print 54

Welding in Soviet Reconstruction 83

Positioned Welding with a Crane 84
T. B. JEFFERSON

Editorial 39

On the Job 72

Short Cuts and Kinks 76

Engineering Data Sheet No. 61 81

New Products to Use 87

News of the Industry 100

About People 110

Helpful Literature Just Published 116

From the Patent Office 122

Classified 145

Index of Advertisers 146

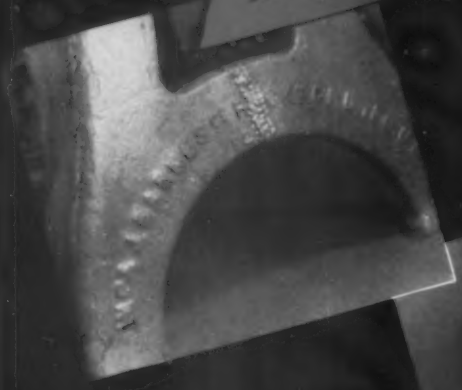
UNLESS ... YOU CAN WELD CAST IRON

IN A VERTICAL POSITION

WITH EITHER AC or DC

AND HAVE MACHINABLE SOUND METAL WITHOUT PREHEAT

WHICH WILL WITHSTAND HYDROSTATIC PRESSURE



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Hard-Facing in an Oil Refinery

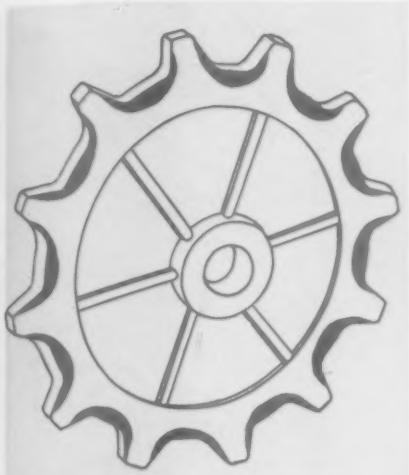


Fig. 1—Worn teeth on a bronze sprocket as built up by hard-facing (black areas).

One of the largest savings in oil-refinery maintenance is that made possible by applying hard-facing to areas where the metal surfaces are in sliding contact. These examples show how costly shutdowns are being avoided.

By **G. W. NIGH**

THE present trend is toward more hard-facing on maintenance work in all industrial plants, and the modern oil refinery is a particularly fertile field to develop a nice crop of savings by this process.

To Overcome Wear

A hard-facing application is made by depositing a layer of hard metal where wear is expected to occur. The effectiveness of the application is measured by the wear resistance of the deposited metal. The usual case is to provide hard metals where there is sliding contact with no lubrication; *i.e.*, dry bearings. Other applications are those where wear is encountered due to contact with the work handled; for example, the wear on power shovel bucket teeth. The use of hard-facing material to build up worn surfaces is universal in the construction and rock product fields.

An oil refinery has many types of machinery with numerous places for reducing wear. Hence many grades of metals are called for to meet all requirements. I will try to cover the different phases of hard-facing applications by citing examples with illustrations. No figures will be given on the cost of making the application—it is always minor compared to the cost of shutting down a unit for changing a part worn to failure.

Teeth on a Bronze Socket

In the line drawings accompanying the text, the location and the extent of the hard-facing is blocked in black. That being understood, let us take up the first example, the bronze sprocket shown in Fig. 1. This sprocket drives one scraper shaft of a chilling machine in which wax and oil or wax with oil and solvent are reduced in temperature. The length of the shaft, about 50 ft, gives an idea of the torque required from each sprocket. A roller chain drives the sprocket, which must be sparkless (non-ferrous) for fire-protection reasons. Due to pressure of the chain rollers on the teeth, the original sprockets wear—seemingly too fast. About 200 are in service and must be maintained for 24 hr operation every day until they are removed on account of wear.

At first, worn sprockets were built up at the teeth by an oxy-acetylene application of silicon-bronze; then a manganese-bronze was used. Both of these metals gave a better life than the original sprockets, but the teeth still wore. A harder, tougher metal to apply to bronze was sought. Aluminum-bronze was considered but was dropped in favor of Monel. The latter is now used, being applied with the oxy-acetylene torch and machined the same as the bronze. The well-known toughness and hardness of Monel metal and its sparklessness make it ideal for this application. This example is cited because a bronze-base metal is usually not considered to be in the field of hard-facing applications.

Cast-Iron Traction Wheel

The next case is cast iron. Fig. 2 shows a head shaft traction wheel for a vertical elevator in the refinery filter plant. These wheels are of cast iron with chilled rims. This elevator has a steel chain carrying the buckets which take the red-hot burned fuller's earth from the furnace and deliver it to overhead coolers on the way to the filters. The load of the chain and the elevated temperature make the wear on the rim of the traction wheel quite severe. After about two years of continuous service, the chilled metal becomes worn off.

Something had to be done in a hurry when a replacement was needed to keep the furnace in operation and none was available. Building up the rim with new cast iron could be done, but it would effect only a short-time repair. The true solution to the problem was hard-facing. The rim was trued up and then rebuilt with a hard-facing metal containing tungsten carbide in a steel matrix. The oxy-acetylene torch was again used for the application, and the rim was finished by grinding. The traction wheel has already been in service much longer than any wheel with a chilled rim, and there are not yet any signs of wear.

The cost of this repair was greater than that of a new chilled-rim traction wheel. But the cost of lifting the heavy chain loaded with buckets and removing the wheel with shaft—all at the top of a casing 100 ft high—is many times the cost of the repair to the wheel. So the savings of one change more than pay for the cost of applying this admittedly expensive metal . . . from present indications the refinery will save the cost of several changes that would be required if ordinary chilled-rim wheels were used.

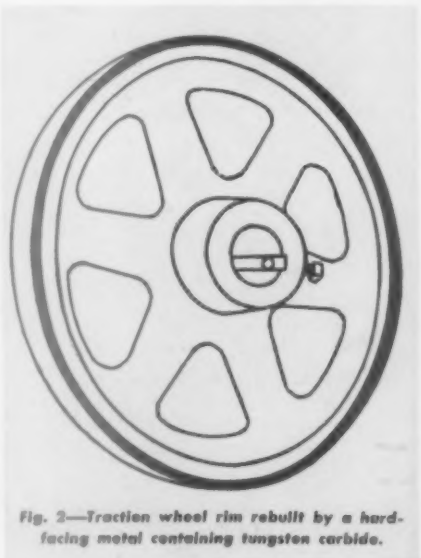


Fig. 2—Traction wheel rim rebuilt by a hard-facing metal containing tungsten carbide.

Dog of Snake Tongs

An entirely different kind of application is shown in Fig. 3, the dog of snake tongs used for making up large pipe. The teeth of this dog wear down, in spite of the fact that the whole piece is made of high-carbon tool steel with tempered teeth. They are reno-

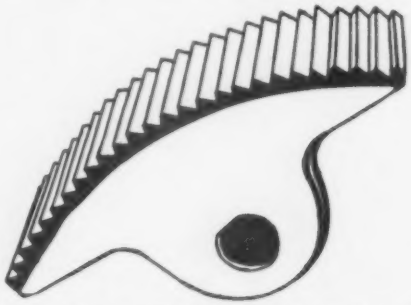


Fig. 3—Dog of snake tongs used for making up large pipe. New teeth were cut from a layer of high-carbon steel welded to the original metal.

vated, when there is enough metal, by drawing the temper, turning off the worn teeth on a lathe, cutting new teeth on a milling machine and retempering. When down to the thickness shown, however, the dogs were previously scrapped. Now the teeth are renewed by welding.

Here's the procedure. The old teeth are ground off by hand on a roughing wheel. A layer of high-carbon steel is built up by using a hard-facing electrode of 1.00% carbon. The dog is then annealed, turned and the teeth cut, after which it is tempered and is ready for use. The short time required to weld on the high-carbon steel saves the body of the dog, which has to be machined from a block of tool steel at the cost of many hours' work. The service life of the 1.00% carbon steel teeth is the same as obtained from the teeth that were first cut in the original steel block.

The 1.00% carbon steel has the further advantage of being machineable in the annealed state, while it takes a temper the same as any carbon tool steel. As it is not a high-speed steel, it is low in cost and so is used in many places where wear is rapid such as on crossheads and valve motion parts on steam pumps. However, it is not corrosion resisting.

Conveyor Screw Bearings

The next type of application to be discussed came up because of a particularly difficult maintenance problem. In a large filter plant, the filter medium—fuller's earth—has to be transferred from bin to bin and between elevators. A considerable part of this horizontal conveying equipment is of the screw type. The screws are supported at intervals on bearings. The journals are in the center of short shafts bolted to lengths of screw flights. The assembly of shaft and screws is shown in Fig. 4. The bearings are split and carried in hangers supported from the conveyor case as shown in Fig. 5.

As supplied by the manufacturer, the shafts were hardened at the journal, probably by flame and quench. The bearing shells are of chilled cast iron. Provision was made for lubrication by grease. As these screw conveyors handle fuller's earth revived by burning, the problem of maintaining the shafts and bearings was not easy. Burned fuller's earth handles just like ground emery. It cut out the bearings and shafts in two weeks. The use of grease lubrication accelerated the wearing action. Seals to keep out this fine grit were no good. A special oil-lubricated sealed bearing lasted less than three weeks. Even oil-impregnated wood bearing shells were sent for trial, but nothing lasted over a few weeks. The maintenance of these screw conveyors soon became a very serious problem.

A new approach was made. The thinking was along these lines: as long as the fuller's earth could not be kept out of the bearings, let it get in freely but find a metal for the bearing and shaft that is harder than fuller's earth. After a number of trials, an all-purpose, air-hardening steel alloy containing molybdenum, tungsten and

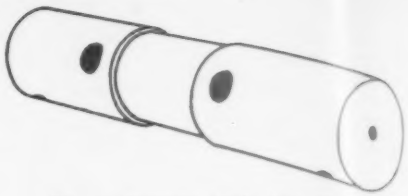


Fig. 6—Conveyor shaft (see Figs. 4 and 5) as prepared for rebuilding.

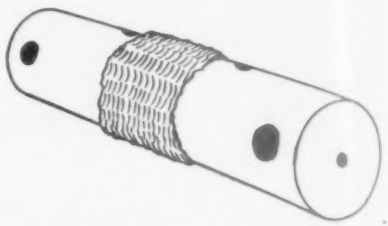


Fig. 7—A layer of hard-facing is added by arc welding.

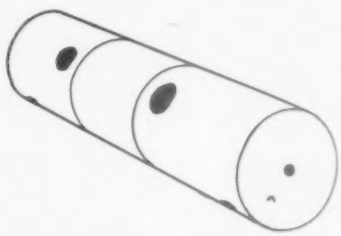


Fig. 8—The shaft is then finished by wet grinding to uniform contour.

chrome was adopted as giving the longest life. Instead of a change of bearings every two weeks, the bearings are now hard-faced and last two and one half years.

The steel shells of the bearings have a layer of hard-facing welded to the inside, leaving, finished, a layer ⅛ in. thick. The shells are ground to correct diameter, with a clearance of 0.010 in. When completed, they are sawed through lengthwise to the hard metal and then broken in two. Thus one shell makes two lower halves of bearings, the upper halves being the old cast chilled iron which carries no load.

The shafts of these conveyors become like Fig. 6 (many being worn even deeper than illustrated) if they are not changed promptly. They are built up by arc welding as shown in

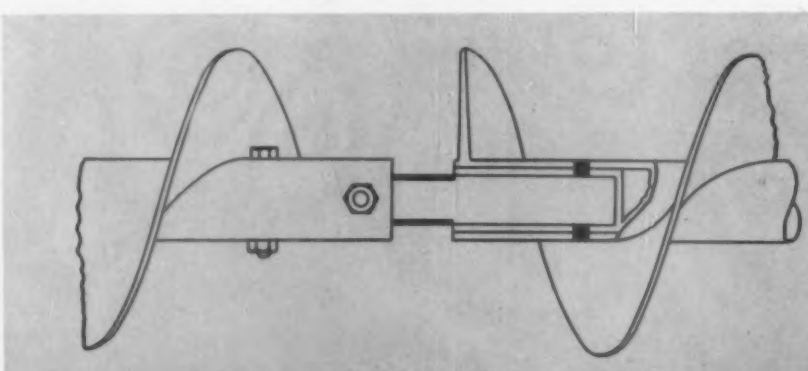


Fig. 4—The assembly of shafts and screw flights for horizontal conveying equipment transporting fuller's earth.

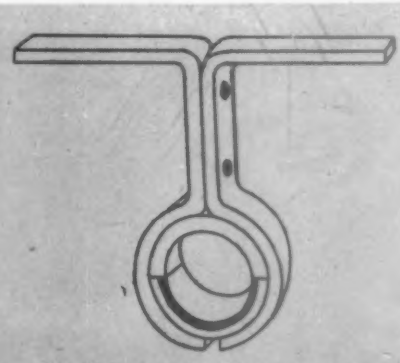


Fig. 5—One of the split bearings for the conveyor screw shown in Fig. 4.

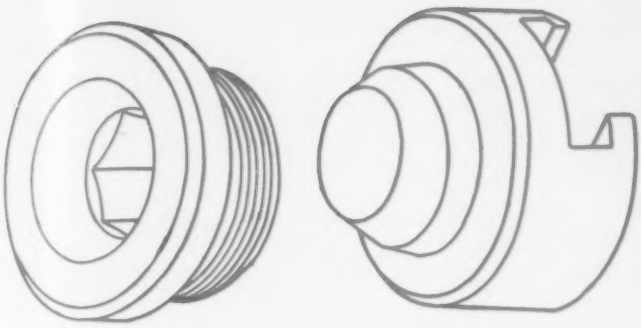


Fig. 9—Blow-down valve seat and plug for power boiler.

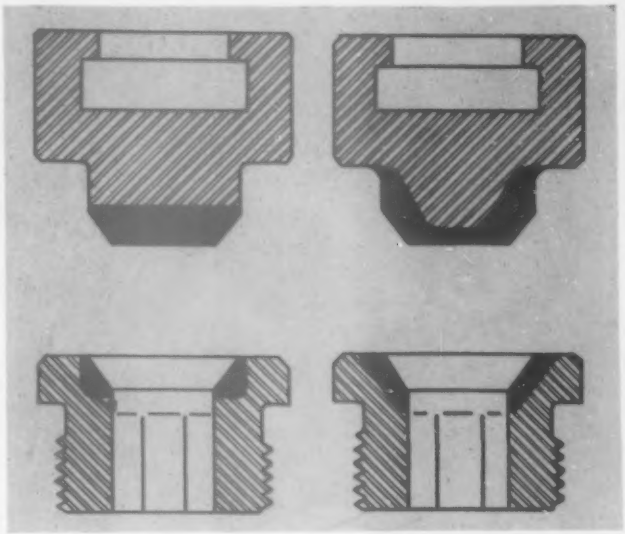


Fig. 10 (center)—Cemented carbide inserts were brazed to the valve seat and plug. Unluckily, the carbide cap did not cover enough of the plug, and the brazing metal could be attacked by the high-velocity hot water.

Fig. 11 (right)—Hard-facing metal gave the exposed surfaces (see Fig. 10) perfect protection against the cutting.

Fig 7. When badly worn, the shafts are built up to ⅛ in. of finished surface with E-7020* electrodes, over which the hard-facing metal is applied. They are then finished by wet grinding to the even contour shown in Fig. 8.

The ground surface of this metal does not seem very hard; a sharp file will scratch it. But a hardness test by Shore scleroscope reads 80 to 82 (590 to 617 Brinell), and its wear resistance is astounding. It is so hard and tough it grinds up the burned fuller's earth, which acts as a lubricant and thus avoids a metal-to-metal contact. A very serious problem has become a mild maintenance job every other year.

Boiler Blow-down Valves

Up to about nine years ago, a bad headache was caused by the maintenance of the blow-down valves on the power boilers. These are small—only ½ in.—but they regulate the continuous blow-down from boilers operating at 650 psi pressure, and the entire pressure drop to atmospheric is across these valve seats. At this velocity, the cutting action of hot water is hard to resist. Valve manufacturer's trim, the best possible to buy, was cut out in ten days. A change in design and the use of chromium plating brought the life up to five weeks before the hot water had cut through the chromium metal. Fig. 9 shows the valve seat and plug.

The first real move to lick the problem was to try a set with cemented carbide inserts as shown in Fig. 10. After eight years, these original seats were without a mark from the high-velocity water. The carbide inserts were attached by brazing or silver soldering. Unluckily, the carbide cap did not cover enough of the plug; the water would cut away the supporting steel, attack the brazing metal and also cut into the brazing metal around the inserted seat.

To avoid this action, which required reseating the inserts and caps, a new hard-facing metal was tried. A modified form of the alloy used for the conveyor screw bearings gave a Shore scleroscope hardness of 85-87 (645 to 662 Brinell). This material is applied with an oxy-acetylene torch. The valve plugs and seats are built up as in Fig. 11.

Results: The ground finished surfaces have not yet been marked; the body of the plug is protected; there is no exposed brazing material to be washed out. All in all, this seems to be the last word in valve trim to resist cutting by high-velocity steam or hot water.

Globe Valve Discs

This experience was so favorable that similar treatment was tried on some valves at the filter plant. These were 2 in. globe valves with neoprene discs on steel seats, sketched in the upper part of Fig 12. The discs were too soft for the treatment they received. Lead discs had longer life; but this metal was still too soft for the strong-armed operators. A sample valve was trimmed as shown in the lower part of Fig. 12 and put under test a year ago where service conditions were the worst. It handles steam and naptha, with some fuller's earth present. After outlasting two sets of lead-trimmed valves, it is still tight and not marked anywhere on the seating surfaces. This valve was trimmed with the same hard-facing metal used on the blow-down valves.

These examples of various phases of oil-refinery maintenance show that it is possible to make equipment last very much longer. Shutdowns for repairs are less frequent and maintenance costs are greatly reduced. The increased life is so much longer it is hard to believe the actual records.

A Hint to Manufacturers

Nevertheless, the possibilities of proper hard-facing point to one long overlooked fact. Manufacturers could make their equipment suitable for longer life instead of leaving it to be done as an alteration job by the refinery mechanical department. The metals for doing this are known and available. It is to be hoped that some progressive company will lead the way.

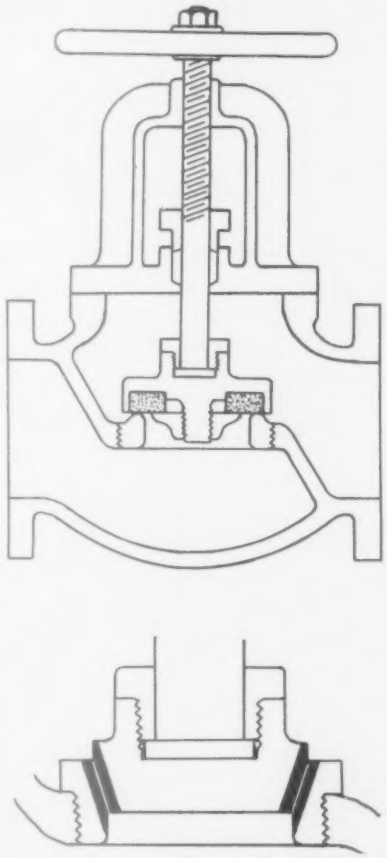


Fig. 12—Globe valve with neoprene disc on steel seats (top drawing). This valve was trimmed with hard-facing as shown in the lower sketch.

*Horizontal fillet and flat-position electrodes. The deposited metal has a tensile strength of approximately 70,000 psi.

Aids to Aluminum Spot Welding

The B-29 Superfortress, sky giant which jumped the war thousands of miles to finish it right in the Jap backyard. Spot welding was important to its construction.

THE development of automatic spot welding of aluminum got its start at Boeing back in 1939 when the company was building its famous Clippers. During the years in which small aircraft had been constructed, the problem of joining together several sheets of aluminum into one large sheet was not encountered, for the wings were not sufficiently large to necessitate such work. The Clippers, however, boasted a wing nearly half a block long, and it was soon discovered that several standard sheets of aluminum would be required to make the wing skins.

Rivets and Wind Drag Eliminated

Since aluminum is manufactured in sheets no wider than 60 in. because of manufacturing and transportation limitations, Boeing was obliged to design and build a spot welder which could weld together the several sheets needed.

Previously, rivets had been used to fasten together sheets of aluminum. The utilization of spot welding to replace the rivets reduced considerably the drag or wind resistance incurred by exposed rivet heads.

Big Planes Bring Problems

That early spot welder worked pretty well but it is considered obsolete today, and the reason is the modern, fully automatic feedtables (see picture on page 45). These were developed by Boeing for producing the large wing skins of the B-17 Flying Fortress, and they proved so successful that other manufacturers of aircraft adopted them for use along similar lines. Of course the new tables were developed as a result of mass production demands, and in the days of the Clippers, when six planes were considered a sizeable order, the early type welder adequately filled the requirements within reasonable tooling costs.

A battery of spot welders in shop 117, plant 2, Seattle. The subassemblies on the conveyor at the left are tunnel panels, ducts and (in the front) a nacelle door for the B-29.

Air-Operated Indexing

With the advent of World War II and the birth of the Flying Fortress and the Superfortress, Boeing designed and produced more than 100,000 special tools, among which were the automatic feedtables for use with standard spot-welding machines. The outstanding feature of this development is a pneumatic indexing mechanism which causes the table to move 0.502 in. after each spot. The sheets are thus stitched together as though by a giant sewing machine. A solenoid air valve controls the indexing, and each machine is able to make more than 60 welds a minute. The indexing control is wired through a relay of the welder and synchronized with the machine. A positive manual indexing system was incorporated to assure the accuracy of the lines of spots. Finally, electromagnetic clamps hold the sheets of aluminum firmly in place while the welding operations are being performed.

All of the controls for the operation of the tables are placed on one panel close to the operator. A motorized free-wheeling device was installed to make movement of the table easy for women employees, who during the war numbered nearly 70% of the total number of people on the Boeing payroll. By pushing a button, the heavy table is made to roll back across the sheet to permit the electrode tips to be cleaned. By reversing the switch, the table is returned automatically to its previous position. Releasing the switch stops the motors and instantly applies brakes to the table, stopping its movement.

These machines are capable of welding aluminum sheets ranging in thickness from 0.016 through 0.040 in. Various combinations of thicknesses can be welded by changing the pressure exerted by the tips and the amount of forge and fire time.

Welding Fixture for Cowlings

Another outstanding welding achievement at Boeing was the introduction of a welding fixture in the cowling manufacturing department. The cowling, made of many pieces of stainless steel, was formerly drilled

Boeing Aircraft learned considerable about [illegible] by welding the large wing skins of [illegible]

By NORMAN GRANDE
[illegible] Welding Dept.,
Boeing Aircraft Co., Seattle
as told to AL JACOBSON

The new developments included an automatically [illegible] feedtable that positioned spots exactly [illegible]

and bolted together prior to spot welding. This required two persons for drilling, locating bolt holes and fastening. With the new welding fixture, the part was mounted on a copper-lined jig. When clamped into position, the various pieces were securely fastened together by a 4 lb welding gun, requiring the services of just one man. The operation was completed in considerably less time than would have been needed for riveting. A ground line was connected to the welding fixture, the current passing from the portable welder through the metal to the copper-lined fixture and to the ground wire.

The fixture was mounted on a revolving table which could be turned by the operator as he welded, thus eliminating the necessity for walking around the fixture. Later the segments were completely spot welded into a single unit.

Spot-Welded Subassemblies

Not including duplicates, there are 40,000 different subassemblies in each B-29 Superfortress, the Boeing sky giant which caused the Japs so much concern during the last few months before they folded. A large percentage of these subassemblies were fabricated by spot welding and later riveted together to form the major assembly. Because of the large number of spot-welded assemblies, a total of more than 50 spot and seam welders were in operation. The majority of these were installed in the resistance-welding shop, though some were located in other shops because of combinations of methods and a desire to eliminate transportation labor and cost.

These machines were divided into three types: the press type, used for flat work such as aluminum wing skins; the rocker type, used on larger assemblies where a high clearance between tips is required; and the press-type roller or seam welder. The latter was used for such assemblies as wing fairings, turret wells and ring jobs requiring pressure-tight seam-welded joints. In addition to all of these machines, a flash-butt welder was also included among the equipment.

Resistance-welding methods have been used here for a number of years in connection with the fabrication of aluminum alloy parts for primary and secondary structures; however, it is only within the last few years that this process was used to any great extent to join sheet aluminum. However, its advantages were quickly recognized, and it soon became a significant factor in the manufacture of large four-engine aircraft. Today the manufacturers are turning out aluminum alloys which can be spot welded on precision machines to produce finished joints practically equal in strength to any other form of joining. The further advantages of labor saving and weight reduction are also provided.

Cut Costs of Cleaning

While there can be no question of the efficiency of spot welding, the problem of preparing aluminum sheets for welding proved to be a tough one to wrestle with. It was soon found that the time needed for cleaning can easily become so large as to be out of proportion to the actual spot-welding time.

Experiments were made with the vapor degreaser process as well as others in an attempt to reduce the cost of preparing large skin sections of aluminum for spot welding. For this type of deoxidation, we originally employed a liquid solution. To eliminate the drying time required, we developed a process of deoxidizing by wire buffing. Both surfaces of the joint had to be buffed not more than eight hours after the sheets had been degreased. Other requirements were:

Surfaces must be freed of dirt and finger prints before welding. The time between buffing and start of weld is not to exceed 30 minutes. The buffing operation is to be controlled to produce a uniform surface condition. Stainless or nickel-steel wire brushes with bristles 0.003 in. in diameter must be used at a speed of approximately 220 rpm. Alcohol may be used after buf-

(Please turn to page 83)

This feedtable was attached to a standard spot welder to speed the construction of a large wing skin for a B-17. The equipment, one of Boeing's 100,000 special tools, welds at the rate of one spot per second.

Good Welds

Even when time is short and conditions are far from ideal, broken locomotive frames can be satisfactorily arc welded. Reaching into the grab bag of experience, Mr. Havens comes up with these interesting examples.

ARC welding broken locomotive frames is today pretty much of an accepted practice, and it is reasonable to expect satisfactory results. Ofttimes, however, it is necessary to carry out an extensive program of stripping and preparation to do a successful welding job on a broken frame. Naturally, any welding supervisor will agree that the best results are secured when the frame is prepared in the manner he recommends. Were it always possible to remove all objectionable parts, apply new sections whenever needed, have the best of equipment and all the time we required—well, that would be heaven, and we would rarely have a failure of an arc-welded frame. This being merely earth, however, the exact opposite of our ideal conditions prevails a good share of the time.

When a locomotive is vitally needed to haul urgent supplies, it is difficult for the railroad weldor to say, "You will have to tie up that engine for several days so I can be sure to do an A-1 welding job." Instead, he is more apt to try to put the engine back in service in the shortest time possible, and if he is a conscientious weldor he will certainly do the very best job he can.

Emergency Welds Can Stand Up

Looking into the case histories of some of these emergency welding jobs, it is surprising to find so many of them still in daily service. Many of those I have in mind were done under conditions that certainly did not contribute to sound arc welding.

I recall, for instance, a seriously broken frame on a big Mikado-type locomotive (Fig. 1). The break occurred under the cylinder saddle and about two bolt holes back from the front of the cylinder. As the top and one side were tight against the cylinder, the frame (at this point 6 by 12 in.) had to be veed entirely from one side. This, at the outset, seemed like a major job in itself, but by using a piercing tip instead of the regular cutting tip the frame was prepared without too much difficulty. When the cut was through to the back side, the vee on the front was plenty wide enough for welding; all that was needed was to chip the flame-cut surfaces bright and fill in with new metal from heavy-coated electrodes.

The obvious and usual repair for a break of this type is to install a new section, replacing all of the front end of the frame from the center of the front jaw to the front deck casting. The weld is then made over the front jaw where it is comparatively easy to secure the correct amount of expansion. In this case, however, we lacked the frame section, and so it was necessary to make the weld as described above.

Most railroads calculate that when a certain engine part starts to fail in any particular place, there will be a repetition of this failure on similar parts of other engines purchased at

Fig. 1—The arrows show where the frame of a Mikado-type locomotive started to crack under the cylinder.

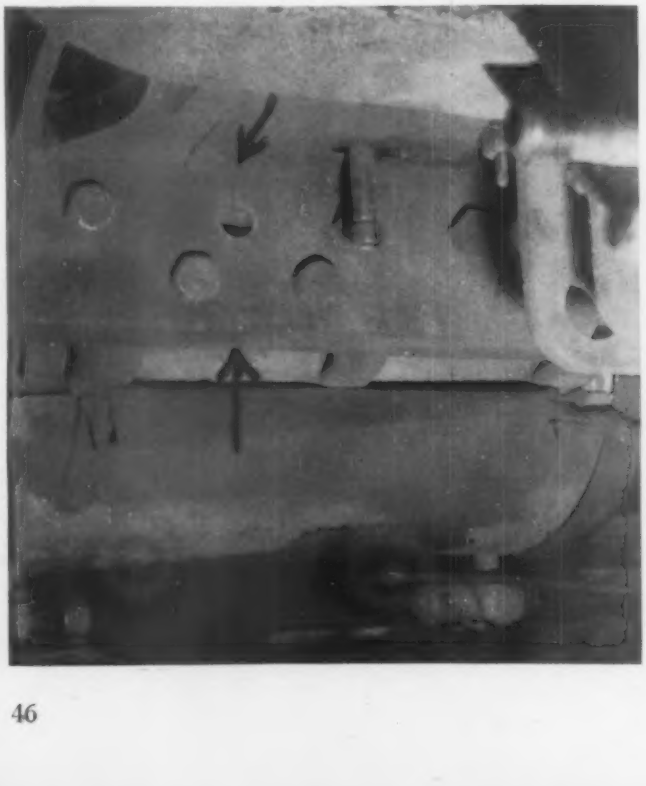


Fig. 2—Despite a serious double break, this engine was back in service in two days. Just enough parts were stripped off to permit access to the frame.

in a Hurry

By **ARTHUR HAVENS**

nearly the same time. This is usually anticipated by buying several of the new parts at once. In the case of the Mikado frame section, the railroad had purchased several of them but due to some unknown cause the sections were all delivered in the rough. As is often the case when a part is not actually needed, the machining of

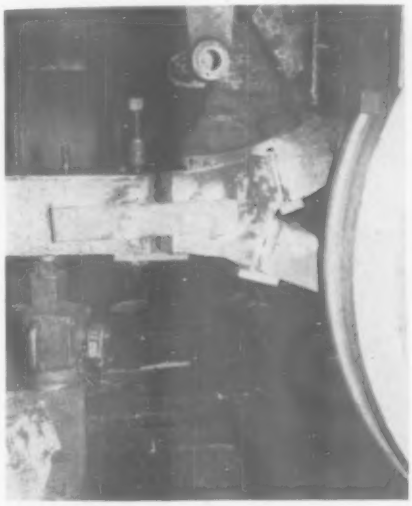


Fig. 3—The new section shown here replaced an old thermit weld, removed broken.

the frame sections was put off—unfortunately too long.

Double Break Repaired

Another frame that had broken under the cylinder and had been successfully repaired by arc welding broke again—this time just back of the cylinders in the double section ahead of the front drivers. The break (Fig. 2) was not only through one rail but through both the top and the bottom rails. Once again the new section in the stores department was useless, for it would have taken many days to machine this part. No one hoped for much from an arc weld; in fact, the heavy frame casting in back of the breaks was not even removed. All that was expected of the weld was to hold just long enough to keep the engine in service until the new section could be machined.

Frankly, this weld had no good reason to hold. Everything was against a satisfactory job. There was insufficient room to work comfortably. It was impossible to secure any expansion because of the location of the break, and no effort was made to do so. The vees were purposely made narrow so that the job could be hurried. The only good thing about the whole job, in fact, was the quality of the deposited metal. The weldors were fussy about this, and each successive layer was carefully cleaned of all slag before another one was attempted. But no amount of reinforcement was applied because we did not expect the weld to hold any length of time. Well, that was two years ago, and the engine is still in service, and the new section is still in the rough—more's the pity!

More Than Weldor's Luck

If this was the only such happening, you might be inclined to say that it was pure luck, but too many such welds are in service for that explanation to hold good. Here's another example:

A fast passenger locomotive engaged in flyer service developed a break in the top rail just ahead of the main drivers. This was the only piece of power available for the train, so something had to be done and quick. The break was veed, just as narrow as possible, and the weld was literally poured into the break. In a matter of three hours after the break was first discovered, the engine was on the outbound, ready for her train.

Common sense would most certainly tell us that that hasty weld could not possibly hold. The truth is that it did. The engine has had a general repair since, and although everyone had intended to remove that "bad" section it is still in service and going strong.

Do not misunderstand me; these are not poor welds but good welds made under difficult conditions. But even though the conditions were not favorable to satisfactory welding jobs, I know from bitter personal experience that the same repairs could not have been effected by any other process.

Repairing a "Mess"

One cold winter day in 1940 a weldor called me to the engine house to look over an assignment that had him grievously puzzled. He had been told to weld a frame on a Consolidation-type freight locomotive. The break was just in back of the cylinder in a 5½ in. by 1 in. section. Examination revealed that the frame had been oxy-acetylene welded without any expansion by a careless weldor. It was, to repeat the weldor's words, a "mess." I advised him to remove all of the bad metal with the cutting torch and told him I would then recommend a method of repair.

I must have thought I would dream of something, for I surely did not know at the moment of any solution except a short new section. But faith is wonderful. By the time he had the unsound material all removed, an idea *had* popped into my head.

This is what I suggested: that he get several short pieces of ¾ in. steel plate the correct length to just fit into the break. These plates were to be single veed on the sides next to the frame. Each one was to be welded securely and then cleaned with the chipping hammer so that the next piece would lie flat on the preceding one. The laminating process was to be carried out until the frame was solid once more. When this had been done, I told him to add a ½ in. reinforcement to both the outside and the inside. My prescription was followed to the letter, and the frame is

(Please turn to page 53)

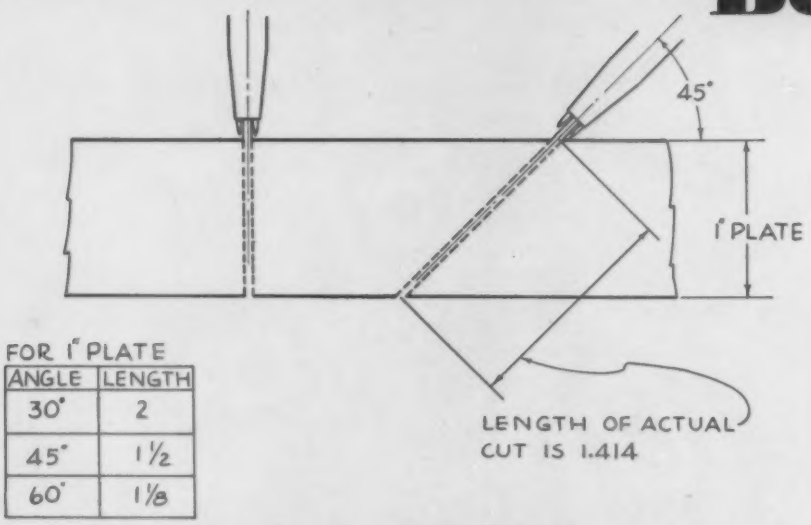
Fig. 4—New frame section as welded with heavy-coated electrodes. Note how the rocker box support casting was welded to the frame.

★ PRODUCTION

Better Jobs

By **A. F. CHOUINARD**
Research & Development Dept., National Cylinder Gas Co.

Labor and material can very easily be wasted in shape cutting if each particular cutting job is not carefully analyzed and all factors taken into consideration. Last month Mr. Chouinard discussed types of machines and tracing devices, when to build a template and when to use manual tracing, nesting odd shapes, filing and storing templates, cutting-machine work tables. The final article in the series, to be published next month, will give more specific examples of cutting problems and furnish a valuable expedient for calculating the volume of cutting oxygen required for a given thickness of metal.
—THE EDITORS



FOR 1" PLATE

ANGLE	LENGTH
30°	2
45°	1½
60°	1⅛

Fig. 9—A bevel cut naturally means more metal thickness to sever, requiring adjustments in speed and cutting oxygen. The table gives the approximate lengths in inches of bevels of various angles cut in 1 in. plate.

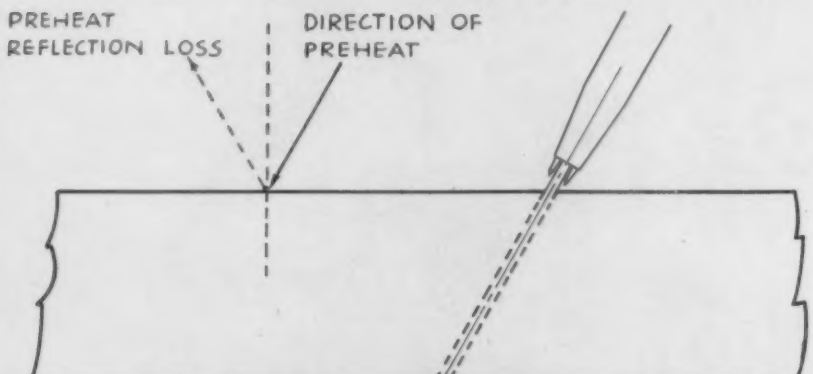


Fig. 10—The loss of preheat in bevels is shown by this sketch. When the cutting tip is inclined, not all of the preheating flames can reach the plate.

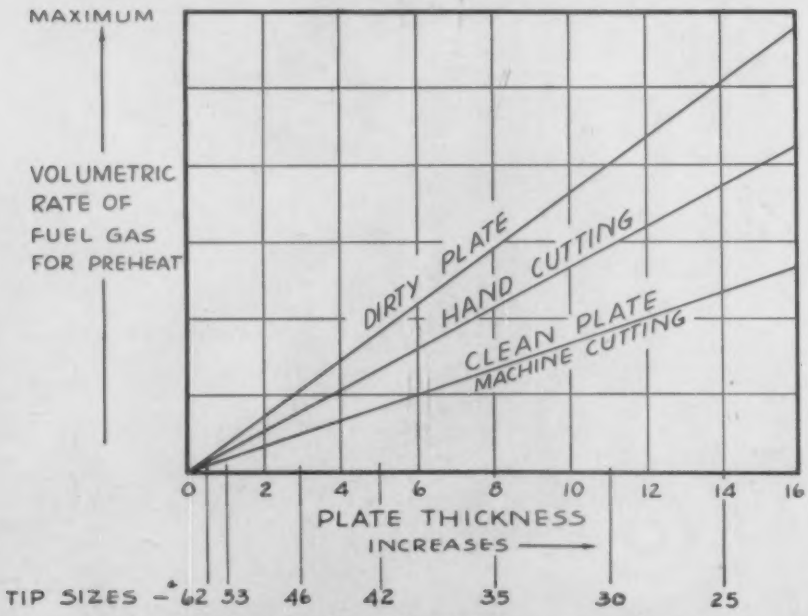

MAXIMUM
VOLUMETRIC RATE OF FUEL GAS FOR PREHEAT
DIRTY PLATE
HAND CUTTING
CLEAN PLATE
MACHINE CUTTING
0 2 4 6 8 10 12 14 16
PLATE THICKNESS INCREASES
TIP SIZES — 62 53 46 42 35 30 25

Fig. 12—Graph illustrating the relationship between plate thickness, tip size and fuel gas for machine cutting, hand cutting and dirty plate.

Beveling Plate Edges

THERE is an appreciable increase in actual cutting length whenever a bevel cut is made. In the 1 in. plate depicted in Fig. 9, a cut normal to the surface would naturally be 1 in. long, while a 45 deg bevel cut as illustrated on the right would cut through almost 1½ in. of stock. (The exact distance, of course, is 1.414 in.) Hence compensation must be made for bevel cuts by adjustment of both speed and the quantity of oxygen required. The table at the left of the sketch gives the approximate length of cut for various angles of beveled edges.

Another problem of bevel cuts is illustrated in Fig. 10. When a torch tip is angled to the plate, not all of the preheating flames can be touching the plate. In this simplified sketch, only about half or less of the preheat flames are properly positioned. Those located at the upper portion of the tip are, of course, some distance from the plate. In addition to the loss of contact of the preheating cones, the direction of the heat at an angle tends to allow it to be deflected as shown in the illustration at the left. For these reasons, tips allowing for a greater quantity of preheating fuel or a larger number of preheat flames are necessary so that an equivalent amount of total preheat can be delivered to the top surface of the plate.

Double Beveling

Fig. 11 illustrates the use of a

from Flame-Cutting

★Part Two—This three-part series gives many helpful suggestions to enable you to get maximum production from shape-cutting machines. This month bevel cuts, tip sizes, problems of multiple cutting are covered.

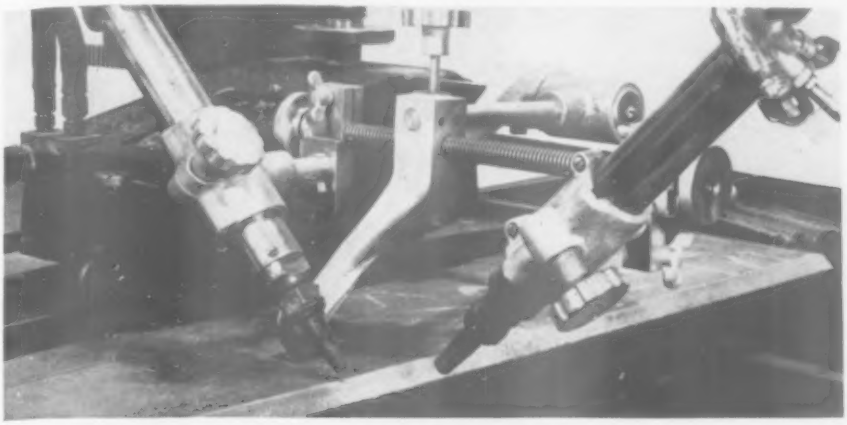


Fig. 11—Double-beveling accessory designed for attachment to shape-cutting machines.

double-beveling accessory for attachment to shape-cutting machines—either on large stationary types or, as shown here, on one of the familiar portable cutting machines. The unit is mounted to pivot on its supporting structure, and the torches are maintained at the same distance above the plate being beveled by means of the follower wheel. In this manner, compensation is made for any unevenness of the plate, and the intersection of the beveled cut is maintained at a constant space relationship with respect to the surface of the plate.

Tip Sizes and Fuel Gas

The graph (Fig. 12) illustrates the family relationship between the amounts of preheat required for various classes of cutting. Plate thickness is indicated horizontally, with the requisite tip size for each plate thickness. The tip sizes are designated by the wire gauge drill size of the cutting orifice. The vertical coördinate represents the volumetric rate of fuel gas employed in these preheats.

The lower curve, identified as "clean plate" (or machine cutting) indicates that as the plate thickness increases so also does the available quantity of preheat. The middle line identifies the preheat quantities required for hand cutting. This quantity is greater for any given tip size than that required for machine cutting, as a torch held manually is not as steadily located as one on a machine. Finally, there is generally a third class of tips for extremely dirty plate.

This graph was prepared merely to indicate the relationship between classes of tips. The designations of machine cutting, hand cutting and dirty plate are not exact descriptions; *i.e.*, the tips identified as for "dirty plate" may be employed in installations designed wholly for high-speed production cutting. In this manner, the preheat starting time is reduced, and the overall production rate increased. All of these classes of tips bear empirical relationship to each other pretty much as shown here.

Multiple Cutting Set-ups

In multiple cutting operations, electrically operated solenoid valves are used to control the preheating and cutting gases. There are usually a pair of these valves for the control of the preheating fuel gas and the preheating oxygen and also a separate solenoid valve controlling the high-pressure cutting oxygen for each one of the cutting torches. All of the high-pressure solenoid valves are operated

Fig. 13—Multiple cutting of a triangular shape (first position). Note the position of the template with respect to the front edge of the tracing table.

Fig. 14—Multiple cutting of a triangular shape (second position). The template has been moved forward on the tracing table and also rotated 180 deg.

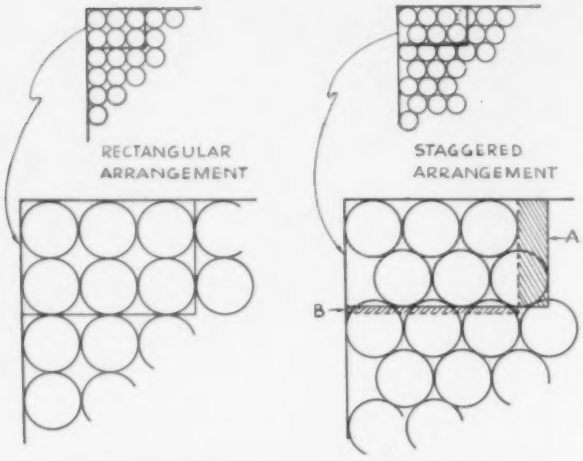


Fig. 15—Rectangular and staggered arrangements for cutting discs from plate. The rectangular arrangement is more economical if shaded area "A" is greater than "B"; the staggered arrangement more economical when "B" is greater than "A".

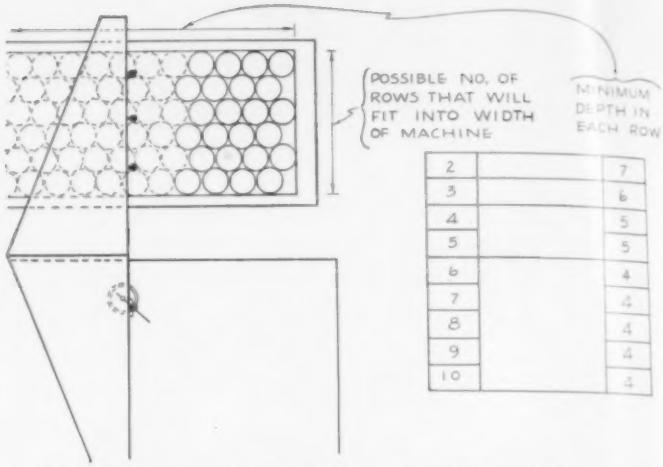


Fig. 16—The number of discs laid across the plate should be an exact multiple of the number of torches. The right-hand column of the tabulation indicates how many discs in each row are necessary before a saving in metal becomes possible.

in unison, and it is simply a matter of providing adequate area through the valves so that no serious pressure drop or volume limitation can occur.

Shape-Cutting Example

Set-ups for multiple cutting introduce many problems, most of which, fortunately, can be solved by the application of common sense. The duplicate cutting of a simple shape is illustrated in the two pictures, Fig. 13 and Fig. 14. The two torches are guided by a template located on the tracing table in the left background. The plate is supported by a T-bar set at an angle on the cutting table. Incidentally, the angle of the T-bar has no effect; it was placed in this manner solely to level the steel being cut.

Template Repositioned

Attention is directed to the position of the carriage with respect to the front edge of the tracing table. In the first picture (Fig. 13) it is within approximately one foot of the front edge of the table; note the increase of the distance as the cutting progresses (Fig. 14). The plate has not been moved in this succeeding cutting operation, but rather the template and the carriage have been moved down the table. Obviously, this was done by repositioning the template in a desired position along the tracing table as shown in the second picture.

Feasibility of constructing duplicate templates was mentioned earlier* when specific reference was given to the manufacture of large templates that might be somewhat difficult to reposition. In the case of small shapes, it is not economical to construct duplicate templates as they may be moved and repositioned easily. That fact is certainly evidenced in these two photographs.

Comparison of the two pictures also brings out the highly significant fact that the template has not only been positioned farther down the table; it has also been rotated 180 deg. The reason for this is apparent from inspection of the shape of the cutout pieces. Each piece is in the general shape of a right-angled triangle. Consequently the rotation of the template 180 deg rotates the apex of this triangle so that it will nest into the triangular portion of the main plate that is yet uncut.

Fig 14 shows clearly that only the minimum amount of scrap plate will be left when these cuts have been completed. The next or third set-up, obviously, will be a duplicate of the first set-up; that is the template will be rotated back to its original relationship to the plate (Fig. 13). There will then be produced parallel cut edges in this neighborhood.

Multiple Cutting of Discs

If a large quantity of discs are to be cut, it might or might not be more economical to nest them. The size and quantity of discs to be cut, the net cutting area of the particular machine and the number of torches available for multiple cutting will determine whether the discs should be arranged in a rectangular or staggered pattern.

Fig. 15 illustrates both the rectangular and the staggered arrangements. Compare the six discs outlined in the small and enlarged views of the rectangular arrangement with the six discs on the right of the illustration in the staggered arrangement. When equal numbers of discs are staggered in rows, there is added to the area of the required plate the shaded area "A" shown to the right. On the other hand, each row saves the area "B", which is the width of the row multiplied by the space that is saved by staggering.

At the point where the long rectangular area "B" equals the area "A" (shown in upper right-hand section) there is no choice between the two methods of arrangement. When the number of discs is less than the number determined at this boundary, "A" is greater than "B" and it is more economical to place the discs in a rectangular arrangement. If the number of discs exceeds the number to the left of the border line in the upper right section, then "B" is greater than "A" and the discs should be staggered.

The division point where nesting becomes more economical is shown more clearly in Fig 16. In laying out work of this nature, it is first necessary to determine how many rows of discs may be staggered across the front edge of the plate. Consideration must also be given to the number of torches on the machine, because the number of discs laid across should be even multiples of the number of torches. Once this figure is known (left column), the right-hand column of the tabulation indicates how many discs in each row are necessary before a saving of metal becomes possible.

In the case illustrated, six discs will fit into the particular width of metal plate. Allowance has already been made for the spacing necessary between discs and for the kerf. As six discs across the front are possible, at least four deep in each row are necessary before metal economy is effected. As the quantity of discs increases, the saving, of course, becomes greater.

The principles just explained can be applied to circlelike shapes as well as to circles and will produce worthwhile economies in any production cutting process.

(To Be Continued)

* Page 47, September, 1945, THE WELDING ENGINEER.

★ OPERATION

Disabled Veterans Make Good

A man with an artificial arm can do as good a job on an assembly line as a normal worker, it was proved at the Mabry Ordnance Shop, Austin, Texas. Welding helped to make the specialized tools that one-armed men can use.

By **CAROLINE VAUGHAN**

Harold D. Dodd, veteran, is starting to "plug in" his lock-type pliers. The socket welded to the neck of the pliers permits him to use this useful tool.

THE Mabry Ordnance Shop, Eighth Service Command base shop, Austin, Texas, was commended by the War Department for being the highest producer of any of the 11 service command shops. Yet the Mabry shop had fewer workers—half of them handicapped, 126 of them veterans—the majority of whom had never before seen an assembly line. The plant covered an area of just 11,000 sq ft; the other shops, all larger, averaged 64,000 sq ft each.

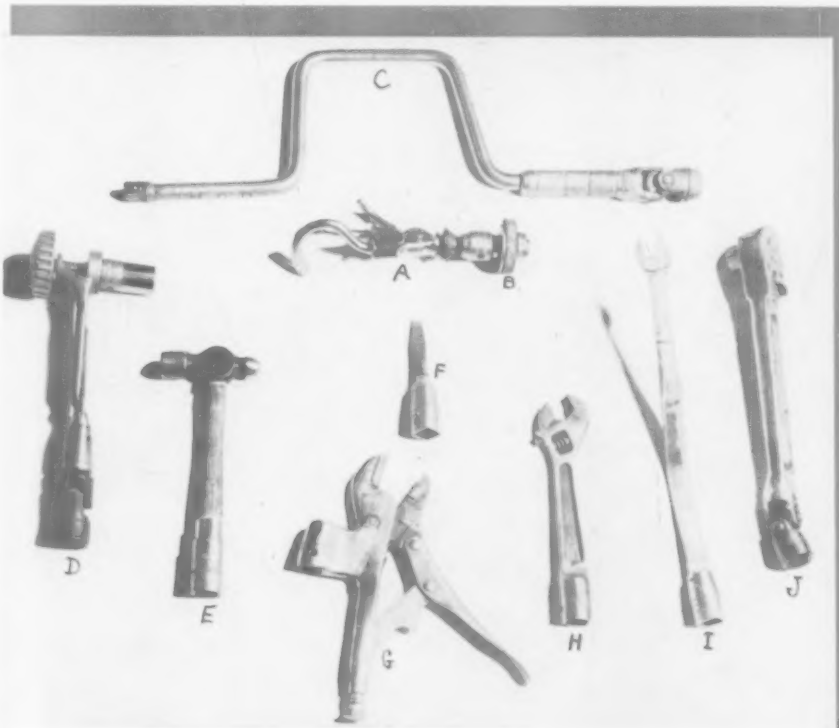
Yet 2,000 engines, 3,000 power train assemblies were rebuilt per month at Mabry. One month 10,238 carburetor and ignition units were sent out of the shop. Speedometers, oil and fuel gauges, windshield wipers and other delicate instruments for every type of army vehicle were rebuilt in perfect condition. In this work, the welding department coöperated with the other departments in the shop to take the ideas of the officers and men and fashion them into expert tools and parts.

During the peak, the welding department operated 21 out of every 24 hours, putting out an enormous volume of repair work and a steady flow of equipment. Welding was also used in many ways throughout the shop. For example, the weldors at Mabry built out of scrap and waste material the first conveyor system in any service command base shop. The pipe and ball-bearing conveyor lines were duplicated by all the shops over the country with the aid of welding equipment.

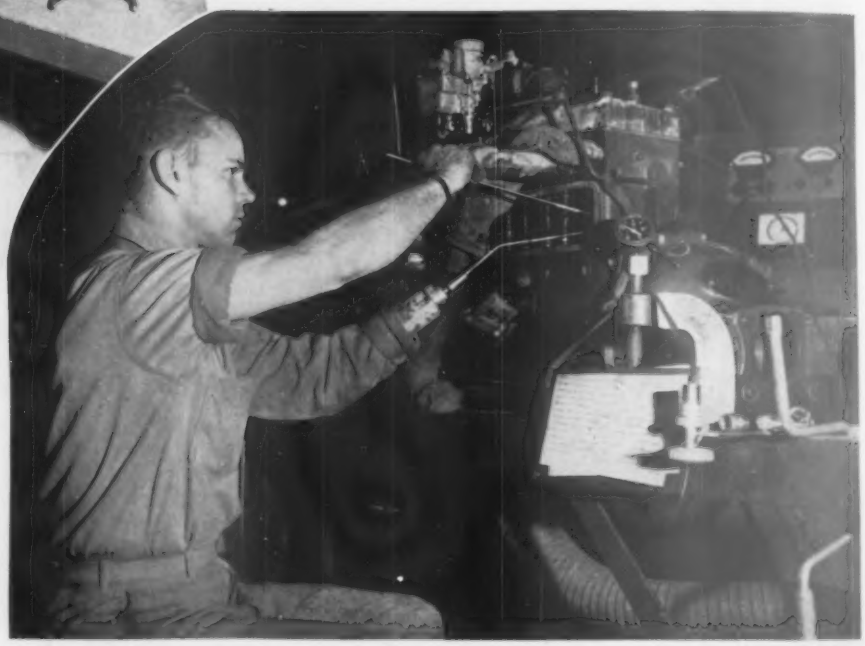
To Aid Armless Men

Captain G. M. Harris, maintenance officer, took a unique idea for aiding handless veterans to the men in the welding department. After study and experiments, a "special adapter" was invented which made armless veterans into the shop's most efficient workers. The adapter substituted for the two-prong hand the veteran originally had to work with, fitting into the artificial arm just as the hand did. On the other side of the thin plate plugging into the arm was a projecting knob with a ball-bearing lock. It was possible to fix many different types of tools on the projecting knob by welding knob-fitting sockets onto their handles.

Any industrial plant or small shop can use this idea, which allows the one-armed man to earn a livelihood on equal terms with other workers. Figure out what that means to the



Various tools that were remade for veterans' artificial arms. Tool "A" is the normal metal hand used in the artificial arm. "B" is the special adapter which allows for immediate removal of the hand or any fitted tool. Note the plug on outside for tool sockets to fit onto and the plug to screw into the arm on the other side. The other tools shown have sockets welded onto shortened handles and may be inserted into the adaptor plug. "C" is the universal speed wrench, "D" the valve tappet adjusting tool, "E" the hammer, "F" screwdriver, "G" lock-type "vice-grip" pliers, "H" adjustable wrench, "I" tappet adjusting wrench and "J" universal ratchet.



☆

How veteran George A. Fox (left) had to use a screwdriver before he was given the new socketed tool.

Below veteran Dodd is using the tappet wrench. He can adjust tappets better than a man with two normal arms and doesn't have to worry about burns from the manifold.

men who sacrificed a good arm for victory at Iwo Jima, Okinawa, *et al!*

An added refinement that Captain Harris put into practice was to weld a standard universal joint on some tools. The universal joint had a standard socket into which the special adapter was plugged. This allowed angle work and wrist movement.

Hope and encouragement to the disabled veteran was not merely a patriotic ideal but a practical practice at Mabry. The high production achieved (see figures in second paragraph) with 50% out of 700 workers "disabled" proves definitely that neither arms, legs, sight nor hearing are necessary to enable a man to earn his living.

Major James W. Dewberry, commanding officer, Colonel L. P. Crim, formerly ordnance officer of the Eighth Service Command in Dallas, and Captain Gerald M. Harris, Mabry maintenance officer, were the men primarily responsible for the Mabry policy of training disabled veterans as well as others physically handicapped. They organized a 90-day course to teach the boys everything there is to know about engines and parts.

Trainees from Hospitals

"You can't be handicapped beyond our ability to teach you a successful salary-demanding trade or skill," asserted Major Dewberry, and he succeeded in making the boast good. Trainees were secured by sending a form letter of information to the veterans at the many hospitals in the Eighth Service Command area, which covers five states. Any veteran had the opportunity for skilled training with good wages while learning. Help in obtaining living quarters in Austin was also given to him as soon as he arrived. Armless, legless, sightless and deaf men enrolled for the course, which covered the entire field of automotive mechanics. Machine shop practice, the receiving, warehousing and distribution of parts, reconditioning and rebuilding and the shipping out of completed units were the principal subjects covered.

The trainee, maybe a one-armed veteran of Leyte, was placed in a production department and taught the operation; after reaching a prescribed standard of efficiency, he was then transferred to another department to go through the same process on a different type of unit. Theory as well as practice was covered by the instruction, and his questions about the work were carefully answered. Upon completion of the course, the veteran was prepared to work in any army maintenance shop or in private industry. Several automobile manufacturers wrote for Mabry employees after having discovered the efficiency and skill of these men as a class.

Beat Normal Production

Armless men using artificial arms became top producers after Captain Harris invented the tools that enabled each man to work on any phase of the assembly line. Their rate of work in many cases was twice the speed in production of normal employees.

"The standard metal hand, the two-prong grasp, is limited in its use," explained Major Dewberry. "Our veterans found, for instance, that an automobile mechanic was severely handicapped trying to use this metal hand in mechanical work. Hence we built a special adapter which permits the immediate insertion of any of various tools.

"One special tool is a standard universal speed wrench. Our modifications permitted the veteran to use it to remove or replace nuts and bolts. The tool has a universal joint just above the socket fitting the special adapter on the artificial arm. A handicapped veteran can actually perform the operation better than if he had his two good arms and hands because his wrench is held more rigidly.

"We also modified a standard valve tappet adjusting tool by welding a socket to the handle. Adjusting valves had previously been an impossible task

to the man having an artificial arm.

"Another of our tools was an automobile hammer with our socket fitted to the handle. This made it easy for the veteran to use a chisel or punch where before he could not perform such an operation satisfactorily. Very similar is a screwdriver with the standard handle replaced by our socket. The many operations requiring the screwdriver were very difficult and sometimes impossible to perform.

"We have also added our socket to the standard lock-type 'vice-grip' pliers, and so the one-armed man can use this tool, which will clamp on anything and hold without further pressure. The socket is welded to the neck of the pliers. Other tools similarly modified include a standard adjustable wrench, a standard universal ratchet and a standard tappet wrench. Tappets can be adjusted better with the latter tool than with a good hand and arm, and the veteran is not worrying about the hot manifold burning his left arm as other mechanics would because his left arm is artificial and replaceable."

Such are the practical ideals of those who look to the future of our fighting men. There is no doubt that eventually the United States will be dotted with such places where a man may prove his right to economic independence regardless of any misfortune to his body.

Merrill Varner lost both of his legs a few inches below each knee at Salerno, yet he doesn't use crutches or even a cane. He can do any job in the shop and is expert at welding.

Veteran William H. Smith is an ex-sailor and a casualty from one of our greatest Pacific victories over the Japs. He uses only his left arm, but his production record is above average for a normal employee.

Good Welds in a Hurry

(Continued from page 47)

still in service, although a new section is ready to install when this "cannot possibly last" weld gives out.

There are times, however, when a short new piece of frame *is* the only out. A splendid example of this was provided by an ancient locomotive used on a light local freight and for switcher service. When this engine was in the shop for a quick general repair job, it was discovered that the frame was working in an old thermit weld. The thermit weld, like a great many made on locomotive frames, adhered to but one end of the frame, enclosing the other in a sort of metal box. This had never given any trouble, but it was now obvious that it was working and should be repaired.

The break had occurred where the top and bottom rails join to make the heavy section that supports the cylinder saddle. It was also directly under the rocker box support casting and was located in a highly troublesome spot. If the piece was removed so that there could be three welds, two of them would have to be in back of the front tire, thus necessitating removal of the front wheels.

To eliminate this difficulty, the vee formed by the junction of the top and bottom rails was continued by bringing it to a sharp point with the cutting torch. The new section (see Fig. 3) was then cut so that, while there were still three distinct welds, there was only a small space between the upper and lower welds. When all was ready and the piece had been tacked in place in perfect alignment, two operators made the two welds on the upper and lower rails simultaneously. When these had cooled, the frame was expanded about $\frac{3}{32}$ in., and the heavy weld was made. Both operators were used for this, one inside and one outside. The rocker box support casting (Fig. 4) was then welded solidly to the frame, and the bolt holes in the casting were filled with weld metal. No bolt holes were drilled in the new piece.

This method of repair saved us a tremendous amount of dismantling and speeded by many days the discharge of the engine from the shop.

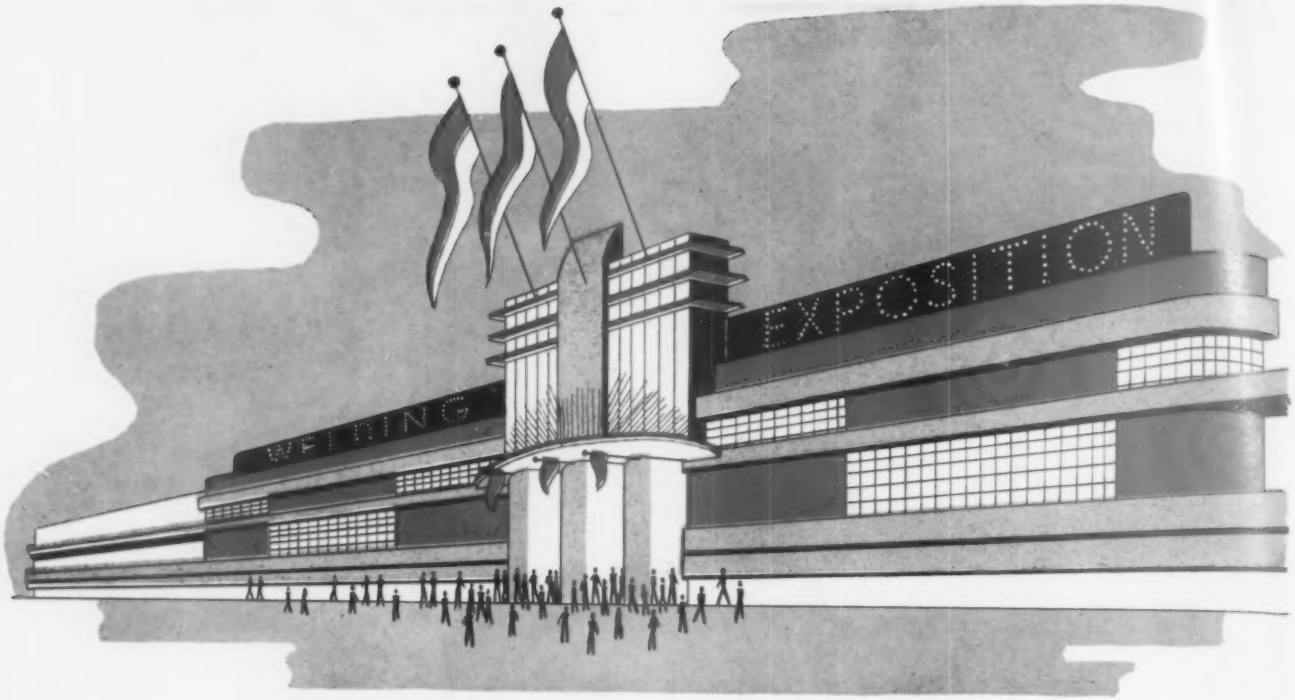
Follow These Rules

Although so many of these arc-welded frames do seem to hold regardless of the forethought or amount of preparation, a few things should be done whenever possible. The vee should always be large enough to permit easy access with the electrode, and particularly so if the frame can be cut from only one side. All oxide should be removed, either by chipping or at least by a good flame-cleaning. It is best to use as large an electrode as the job and equipment will permit. It is not exceptional, after a weld is well in progress, to use as large as a $\frac{5}{16}$ in. heavy-coated electrode.

The weld itself should be made on a side hill, for this is easier for the operator than a direct vertical weld. Most frame weldors prefer an oscillating bead and use three beads to complete each layer, one on each side and one in the middle.

Most popular makes of electrodes are good for this work, and equal success seems to be attained with either d-c or a-c equipment.

This method of repairing broken frames was a boon to many railroads during the war, and there is no question but that it will become still more popular in the future. Naturally, more thought should be given to expansion control and to postweld normalizing whenever there is time to do a complete job. Lacking that time, however, we will go right on knitting the broken frames together wherever and whenever we can, using the emergency arc-weld repair method to keep vitally needed giants of the rails in service.



WELDING EXPOSITION *In Print*

Since the customary Welding Show wasn't held this fall, the following pages are published to let you attend a "Show in Print." We hope you will be able to find all of the products that would normally be featured at the regular exhibit.

Acro Welder Mfg. Co.

1825 W. St. Paul Ave., Milwaukee 3

ACRO

WELDERS—BRAZERS

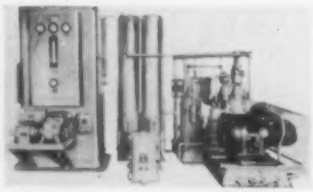
Products: Resistance welding and brazing machines (spot, seam, projection, butt, flash, gun, tong, precious metal); welding analyzers.
Latest Literature: To suit applications.

» «

Air Products, Inc.

Manufacturers Road, Chattanooga 5

Products: Manufacturers of oxygen generators; a complete line of equipment for producing oxygen, nitrogen and other commercial gases from atmospheric air.
Latest Literature: "Making Your Own Oxygen."



"Air Products" Oxygen Generator

» «

Air Reduction Sales Co.

60 E. 42nd St., New York City 17

Products: A-c or d-c arc welders; arc-welding accessories and electrodes; oxy-acetylene welding and cutting apparatus; flame-cutting machines; flame-hardening, flame-cleaning and flame-gouging apparatus; acetylene generators; industrial gases, liquids; calcium carbide; rare gases; safety and protective equipment.
Latest Literature: Airco electrode catalog No. 120; Airco gas welding and cutting supplies and accessories catalog No. 40.

Everything for Arc or Gas Welding

» «

Aladdin Rod & Flux Mfg. Co.

P. O. Box 935, Mad. Sq. Sta., Grand Rapids, Mich

ALADDIN ROD

No Puddling . . . No Flux

Products: "Aladdin" rod for white metal welding and for soldering and brazing aluminum.

Latest Literature: Complete instructions for welding white metal and for soldering and brazing aluminum.

Aljay Mfg. Co., Inc.
401 Denckla Bldg., Philadelphia 7

Weldors' "Fly-Front" Coat

Products: Weldors' clothing of leather; coats, overalls, capes, bibs, gloves, pants, chaps, sleeves, aprons.
Latest Literature: Illustrated catalog G, which pictures and describes the complete line of Aljay "Saf-T" Garments.

» «

Allis-Chalmers Mfg. Co.
Milwaukee 1

"Ampac 200" A-C Welder

Products: "Ampac" a-c welders, "Weld-O-Tron" electronic d-c welders, complete line of electrodes, accessories and auxiliary equipment.
Latest Literature: Arc welder price book, electrode comparison chart B-6344A.

» «

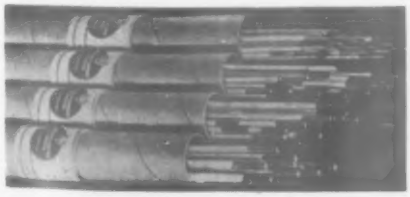
Alloy Rods Co.
York, Pa.

"Arcaloy" Stainless Electrodes

Products: "Arcaloy" stainless-steel electrodes; "Tool-Arc" tool-steel electrodes; "Nickel-Arc" electrodes for cast-iron welding.
Latest Literature: "Arcaloy" stainless catalog SS145; "Nickel-Arc" bulletin NA7-45; "Tool-Arc" catalog; "Arcaloy" stainless bulletin A7-45.

» «

Aluminum Company of America
801 Gulf Bldg., Pittsburgh 19



Alcoa Welding Electrodes

Products: Fluxes for gas welding, automatic carbon-arc and metal-arc welding, furnace, torch and dip brazing of aluminum; aluminum gas welding and brazing wires; electrodes in various sizes.
Latest Literature: "Welding and Brazing Alcoa Aluminum."

» «

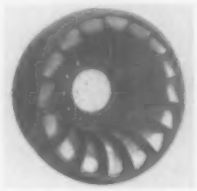
American Agile Corp.
5806 Hough Ave., Cleveland 3

AGILE ACTARC

Products: Arc-welding electrodes for welding of mild steel, high-tensile steel, general-purpose hard-facing, welding of cast iron, and bronze. Also electrodes for special welding applications to all types of alloy steel for wearing surfaces and cutting edges. Agile "Metalklad" welding lens with 42% more visibility.
Latest Literature: Complete catalog upon request.

» «

American Arc Welders, Inc.
Roseau, Minn.



Eight-Foot Cast-Iron Hydro Runner Rebuilt with "Copper-Arc" Electrodes by the Seattle City Light Dept.

Products: "Nico" electrodes, "Copper-Arc" electrodes, "Bronz-Arc" electrodes, "Arcast" electrodes.
Latest Literature: Descriptive literature on each type.

» «

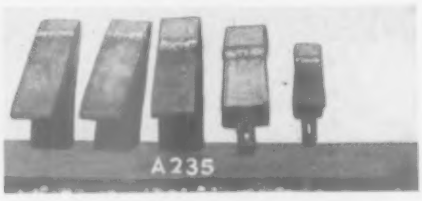
American Ind. Safety Equip. Co.
397 Bridge St., Brooklyn

"Lift Front" Goggles

Products: Gloves, helmets, hand shields, goggles, respirators, lenses and plates, face shields, spectacles.
Latest Literature: New descriptive folders and catalog.

» «

American Manganese Steel Div.
Chicago Heights, Ill.



Amsco Salvaged Dipper Teeth

Products: Amsco welding products for the reclamation, hard-facing and repair of ferrous equipment parts.
Latest Literature: Bulletin 941-W on Amsco welding products; Bulletin 742-W on Amsco "Dieweld"; bulletin on "Toolface," leaflet on "Farmface."

» «

American Optical Co.
Southbridge, Mass.

AO "Duraweld" Welding Goggle

Products: Welding goggles, helmets, hand shields, lenses, plates, jackets, overalls, pants, sleeves, gloves, leggings, spats respirators.
Latest Literature: "AO Weldors' Clothing"; "AO Protective Equipment against Glare and Injurious Light"; "AO Filter Glass Shade Numbers for Welding and Cutting Processes"; "Absorptive Efficiency of AO Calobar Glass."

» «

American Solder & Flux Co.
2152 E. Norris St., Philadelphia 25

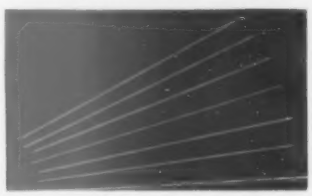
AMCO GALVANIZING MATERIAL

POWDER STICK BAR

Products: Galvanizing compound for making repairs on damaged galvanized surfaces.
Latest Literature: Bulletin No. 52.

» «

Ampco Metal, Inc.
1745 S. 38th St., Milwaukee 4



"Ampco-Trode" Licks Tough Welding Jobs

Products: "Ampco-Trode" coated aluminum-bronze weldrod—5 grades, 5 hardnesses, excellent for bearing service. "Phos-Trode" a-c/d-c shielded-arc phosphor-bronze weldrod.
Latest Literature: Bulletin W3, "Ampco-Trode" catalog; Bulletin W2, "Ampco-Trode" welding technique; Bulletin W7, "Phos-Trode" catalog.

» «

Anti-Borax Compound Co.
1506 Wall St., Fort Wayne 6, Ind.

Products: Cast-iron flux No. 1; brazing flux No. 2; "Braz-Cast" flux No. 4; aluminum fluxes Nos. 5 and 8; magnesium

"ANTI-BORAX" Oxy-ACETYLENE WELDING & BRAZING FLUXES

alloy flux No. 15, silver solder paste flux No. 16.
Latest Literature: Folders containing complete list of products.

» «

Arcos Corp.
1515 Locust St., Philadelphia 2

Quality Weld Metal, Easily Deposited

Products: Stainless electrodes, special low-alloy electrodes and non-ferrous electrodes.
Latest Literature: Time-saving reference chart of weld-metal properties and welding information; many other bulletins.

» «

Paul O. Ashton
2724 Mahoning Ave., Youngstown, O.

Weldor's Eye Lotion

Products: "Weldors' Eye Lotion" giving rapid and safe relief for "arc burns" following weldors' flash.
Latest Literature: "Modern Medical Magic," a folder describing the above product.

» «

Atlas Welding Accessories Co.
14824 Wyoming Ave., Detroit 21

Atlas Model A "Dual-Tool"

Products: The Atlas line of weld-cleaning tools with heads of hand-forged tool steel. Fourteen models—one to meet every requirement and preference of weldors.
Latest Literature: Contact your local Atlas dealer or write for recent literature.

» «

Baier & Ackerman, Inc.
18 E. 41st St., New York 17

Products: The "Arc-Time Recorder" meters the performance of each welding

"Arc-Time Recorder"

machine and operator on an equitable basis by totalizing the actual arc time in minutes. This affords the weldor a reliable indication of his actual performance.
Latest Literature: "Arc-Time Recorder" pamphlet.

» «

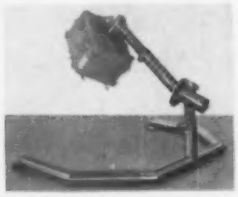
Bay State Abrasive Products Co.
Westboro, Mass.

Grinding Wheels

Products: Grinding wheels, diamond wheels, honing stones, mounted wheels and points, sharpening stones and oil stones, terrazzo wheels and bricks.
Latest Literature: General catalog; mounted wheels and points book; bulletins on each type of product.

» «

Bentley Weldery, Inc.
Box 1038, Dept. R., Syracuse, N. Y.



Bentley 500 lb Work Positioner

Products: Balanced welding fixtures and positioners for automatic and hand welding, assembly work, etc. Hand operated—360 deg rotation, 135 deg of tilt.
Latest Literature: "Faster Work at Lower Cost."

» «

Bethlehem Steel Co.
Bethlehem, Pa.

Welded Gear Case for Marine Drive

Products: The all-welded base and upper gear case illustrated was built to house the gear reduction unit for twin-screw tankers. Other Bethlehem products include buildings, bridges, tanks, towers, oil-refinery and chemical-plant equipment, welded steel pipe, etc.

» «

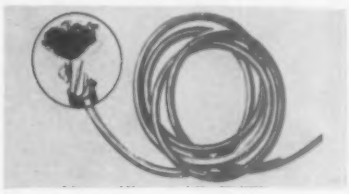
Borm Mfg. Co.
23 N. Union St., Elgin, Ill.

Series WB "Elgin" Arc Welder

Products: A-C arc welders in four practical sizes 150, 200, 250 and 350 amp.
Latest Literature: Catalog page describing the "Elgin" line of a-c arc welders.

» «

Burdett Oxygen Co.
3302 Lakeside Ave., Cleveland

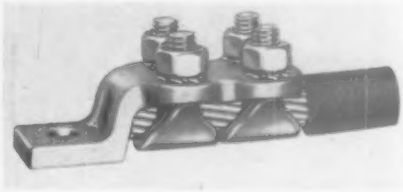


"Extra-Flex" Welding Cable

Products: Welding and cutting outfits, welding rods, acetylene generators, hose and hose connections, cylinder trucks, face shields, goggles, lenses, regulators, torches, pressure gauges.
Latest Literature: New 60-page catalog.

» «

Burndy Engineering Co., Inc.
107 Bruckner Blvd., New York 54

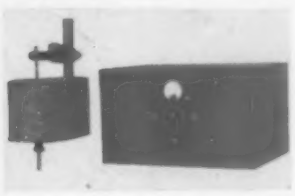


Type VAA "Varilug"

Products: "Variline" connectors for flexible and extra-flexible welding cables; all types of solderless connectors for every kind of application.
Latest Literature: Burndy electrical connector catalog No. 41.

» «

Carpenter Products, Inc.
85 Washburn St., Bridgeport, Conn.



Self-Forging Spot Welder

Products: Condenser discharge spot welder for welding small wires of dif-

ferent materials—light-gauge aluminum sheet, nickel wire to nickel sheet, copper to copper, tungsten to tungsten, etc.
Latest Literature: Reprint of descriptive article from July, 1945, issue of *Electronic Industries*.

» «

Carter-Lockard Co.
225 W. 11th St., Los Angeles 15

Chambers Helmet Goggles

Products: "Klearsite" non-pitting "Koverglas"; "Holdtite" non-rubber goggle headbands; "C-L" slag hammers; Allison electrode holders.
Latest Literature: Envelope stuffers on above items.

» «

The Champion Rivet Co.
Harvard Ave. & E. 108th St., Cleveland

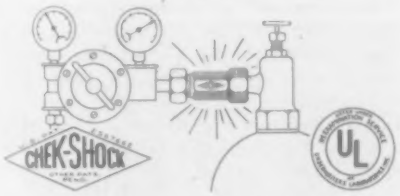
1895 1945

A Champion Is Always a Leader

Products: Mild-steel electrodes; high-tensile electrodes; special electrodes and oxy-acetylene rods; welding accessories (goggles, welding machines, clamps, clothing, fluxes, cable, holders, etc.).
Latest Literature: New catalog.

» «

Chek-Shock Mfg. Co.
Fowler, Calif.



"Chek-Shock" Oxygen Cushion Valve

Products: "Chek-Shock" cushion valves for high-pressure oxygen, hydrogen, nitrogen and helium gases for industrial or medical use.
Latest Literature: Descriptive literature available from leading welding distributors or from factory at Fowler, Calif.

» «

Chicago Eye Shield Co.
2300 Warren Blvd., Chicago 12

Products: Welding helmets—supplied-air and regular; welding and chipping goggles; flash-and-glare protection goggles.
Latest Literature: "Modern Welding," a

"Cesco" Supplied-Air Welders' Helmet

booklet describing the new supplied-air welding helmet.

» «

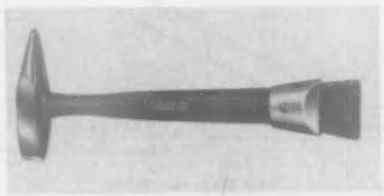
Chicago Hardware Foundry Co.
North Chicago, Ill.

Fuse-Well Cast Welding Rods

Products: Cast-iron welding rods and electrodes, plain and alloyed; cast aluminum rods of standard analysis; welding flux.
Latest Literature: Price list and brochure.

» «

Chicago Mfg. & Distr. Co.
1928 W. 46th St., Chicago 9



Welders' Chipping Hammer

Products: Weld-cleaning tools to meet every need. Model illustrated combines 3 tools in 1—drift, chisel and removable wire brush.
Latest Literature: Bulletin illustrating five styles of chipping hammers.

» «

Chicago Welding Sales Co.
3349 Ogden Ave., Chicago

Welding, Tinning, Radiator Compounds

Products: York's "77" cast-iron brazing flux with four important extra features; York's "Solder-It" boiler and radiator mend; York's "tinning compound" which cleans and tins in one operation.
Latest Literature: Circular describing the above three products.

» «

Churchward Engineering Co.
103 Sperry St., New Haven, Conn.

Products: "Duro" electrode holders are made in the following sizes: 250, 300, 400, 500 and 600 ampere capacities.
Latest Literature: We will, on request, send you the name of your nearest distributor who will give you prompt and efficient service.

» «

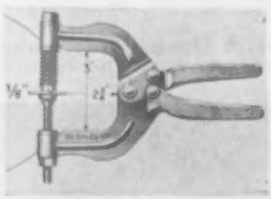
Cullen-Friestedt Co.
1309 S. Kilbourn Ave., Chicago 23

No. 50 and No. 140 C-F Positioners

Products: Manual and motor-operated welding positioners in capacities from 1,200 to 30,000 lb. Features include independent rotating and tilting movement with complete 360 deg table rotation and table tilt from horizontal to 135 deg beyond.
Latest Literature: C-F Positioner bulletin WP-22.

» «

Detroit Stamping Co.
372 Midland Ave., Detroit 3



"De-Sta-Co" Portable Clamp

Products: Toggle clamps, portable welding clamps, latch clamps and other types of clamp for securing work in jigs or fixtures.
Latest Literature: Catalog illustrating models offered and showing practical applications.

» «

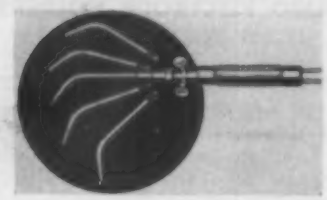
The Diversey Corp.
53 W. Jackson Blvd., Chicago 4

DIVERSEY

METAL CLEANERS

Products: Diversey "Everito" for removing rust and heat scale; Diversey DC No. 22 for removing oil and grease prior to welding; Diversey DC No. 36 cleaner for preparing aluminum alloys for painting and anodizing; Diversey X514 cold etch for preparing aluminum alloys for spot welding.

Dockson Corp.
3039 Wabash Ave., Detroit 8



Dockson SE Aircraft Torch

Products: A complete line of oxy-acetylene welding torches, regulators and cutting torches; also complete head and eye protection.
Latest Literature: Write for latest catalog.

» «

Dow Chem. Co., Magnesium Div.
Midland, Mich.

Arc Welding Magnesium

Products: Magnesium bars, shapes, forgings, castings and sheets; welding rods and flux for magnesium welding.
Latest Literature: DM94—"Joining Magnesium."

» «

Eccles & Davies Machinery Co.
1910 Santa Fe Ave., Los Angeles 21

Locomotive Cylinder Arc Welded with "Edco"

Products: "Edco" phosphor-bronze shielded electrodes.
Latest Literature: "Edco Phosphor-Bronze Electrodes," a 16-page booklet.

» «

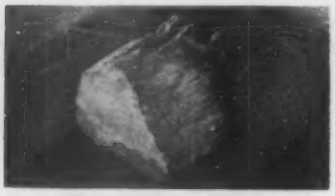
Federal Machine and Welder Co.
Warren, O.

Federal Flash Welder for Heavy Steel Rings

Products: All types of resistance welding equipment; special applications engineering on resistance welding.
Latest Literature: Bulletins on spot welders, projection welders, flash and butt welders, portable gun welders, barrel welders, seam welders; special booklet describing steel container production; special booklet describing complete plant for welding heavy steel rings.

» «

Foote Mineral Co.
1621 Summer St., Philadelphia 3

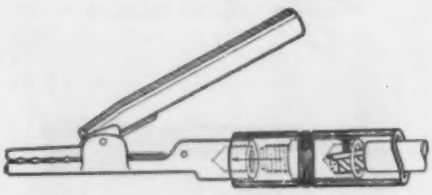


Foote Ferro-Manganese

Products: "Calgran" (granulated calcium carbonate); clay; ferro-alloys of boron, chrome, columbium, manganese, molybdenum, silicon, titanium and vanadium; feldspar; "Pariflux" (welding grade fluorspar); "Hymag," "Weldalene," "Welrite" and other chemical products.
Latest Literature: 1945 edition Foote welding materials catalog.

» «

Gem Electrode Holder Co.
1133 Broadway, New York 10



Gem Electrode Holder

Products: Electrode holders. The jaws of the Gem holder can be removed by a few turns, permitting rapid cleaning and replacement. Handle does not need to be disconnected from cable.
Latest Literature: Circulars.

» «

General Electric Co.
1 River Rd., Schenectady 5, N. Y.

Overhead Welding with G-E W-56 Electrodes

Products: Arc-welding equipment, electrodes and accessories. Newest electrode is the Type W-56 for welding low-alloy, high-tensile steels.
Latest Literature: Bulletin GEA-4081-A, "Alternating-Current Arc Welders"; other bulletins on arc welders, electrodes and accessories.

» «

General Electric X-Ray Corp.
175 W. Jackson Blvd., Chicago 4

Products: A complete line of X-ray equipment, X-ray supplies and accessories,

X-Raying a Welded Seam

used for the inspection of welds and other industrial purposes.
Latest Literature: Pub. No. 11A-1150, "X-Ray in Postwar Era."

» «

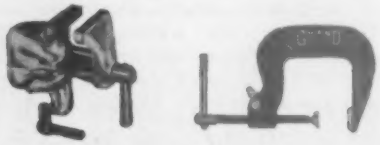
Claud S. Gordon Co.
3000 Wallace St., Chicago 16

Tempil ° Products

Products: Tempil° measures working temperatures at 25 to 50 deg intervals in range from 125 to 1,600 F. In pencil, pellet or liquid form—indicates preheat temperature before welding.
Latest Literature: Tempil° preheating chart and Tempil° scale for weld-bend testing.

» «

Grand Specialties Co.
3129 W. Grand Ave., Chicago 22



"Quikcet" Vise and Grand "Clampmaster"

Products: The "Quikcet" speed vise and "Clampmaster" extra-deep-throat speed clamps are two new spatterproofed products added to the Grand line. Other Grand clamps are available in a wide range of sizes.
Latest Literature: New catalog No. 450; weldors' pocket manual No. 145 on clamps and vises.

» «

Handy & Harman
82 Fulton St., New York 7

Fast Brazing with "Easy-Flo" Rings

Products: Silver-brazing alloys: "Sil-Fos," "Easy-Flo" and "Easy-Flo No. 3";

"Handy-Flux"; fine silver anodes for plating.

Latest Literature: Bulletin No. 11 telling how to join tool tips to shanks; bulletin No. 12A giving full details about "Sil-Fos," "Easy-Flo" and "Handy-Flux"; bulletin No. 14 covering the repair of broken tools and cutters.

» «

Harnischfeger Corp.

4400 W. National Ave., Milwaukee 14

P & H Model WA-200 Welder

Products: A-c and d-c arc welders, welding electrodes, welding positioners, production-welding control systems, electric hoists, overhead cranes.

Latest Literature: Complete illustrated literature available on all P & H welding products.

» «

The Harris Calorific Co.

5501 Cass Ave., Cleveland 2

No. 62 Harris Cutting Torch

Products: Oldest U. S. manufacturer of welding torches; cutting torches for acetylene, hydrogen, city and natural gas, propane, butane and other liquefied petroleum gases; regulators for cylinders or piped lines; manifolds; other gas welding and cutting apparatus and fittings.

Latest Literature: Harris catalog No. 12.

» «

Hercules Elec. & Mfg. Co., Inc.

2500 Atlantic Ave., Brooklyn 7

A-C Welder Control Panel, Model A-160

Products: Arc welders, welding rods, magnetic clamps, rectifiers, solenoids, electronic timers, transformers, electric controls, spot welder equipment.

Latest Literature: Arc welding, transformer, solenoid, magnetic aligner catalogs.

» «

Hobart Bros. Co.

Troy, O.

Products: Hobart "Multi-Range" arc welders are available in a full range of sizes. All have exclusive remote control with 1,000 steps of voltage and current control.

Electric & Gas Driven "Multi-Range" Welders

Latest Literature: "Practical Design for Arc Welding," 3 volumes, $3.50 each; "Lessons in Practical Arc Welding," 75c. Free Publications: "Weldor's Vest Pocket Guide"; "Designs You Can Patent"; "Common Faults in Welding."

» «

W. J. Holliday & Co.

Hammond, Ind.

"Speed Case" Welded Mold for Aircraft Part

Products: "Speed Case" and "Speed Treat" plate—free-machining steels of high welding adaptability and responsiveness to heat treatment.

Latest Literature: Catalog No. 1243, 32 pages, on "Speed Case" plate and "Speed Treat" plate.

» «

Hollup Corporation

4700 W. 19th St., Chicago 50

SUREWELD ELECTRODES
HOLLUP WELDERS

Products: "Sureweld" protected-arc electrodes, Hollup gas welding rods, Hollup arc welders and "Shortstub" electrode holders. Newest product is "Sureweld CN," an all-position a-c/d-c mild steel electrode made to AWS specifications.

Latest Literature: Descriptive folder NH 104. Electrode catalog NH-103 and "Selectrode" chart NH-502 will be available soon.

» «

Independent Pneumatic Tool Co.

600 W. Jackson Blvd., Chicago

Thor No. 250-G Air Grinder

Products: Complete line of air grinders, chipping hammers and other types of pneumatic and electric tools.

Latest Literature: Pneumatic tool catalog No. 52-B; Universal electric tool catalog No. 38; electric tool catalog No. 61.

» «

International Nickel Co., Inc.

67 Wall St., New York 5

NICKEL
INCONEL
MONEL

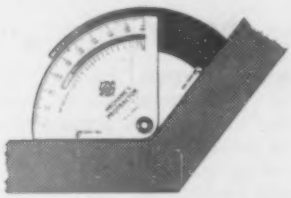
Products: Producers of nickel, Monel, Inconel and Inco nickel alloys, including electrodes; flux for welding these metals and alloys.

Latest Literature: Bulletin T2, "Welding, Brazing and Soft Soldering of Monel, Nickel and Inconel."

» «

Interstate Sales Co.

1123 Broadway, New York 10



Wolfe Mechanics' Protractor

Products: Pipe layout devices—Wolfe Mechanics' Protractor, Wolfe "Angle Meter," "Divizor" and "Mechanics' Protractor."

Latest Literature: Catalog 44 and supplementary bulletins.

» «

Jackson Products

3265 Wight St., Detroit 7

Jackson's "Featherlight" A-4W, 300 amp

Products: Insulated and semi-insulated electrode holders; modern devices for protecting the eyes and face.

Latest Literature: Bulletins covering all models of holders and shields on request.

» «

Fred Jessar

404 Denckla Bldg., Philadelphia 7

"Saf-T" Curtains for Welding Booths

Products: Welding curtains; weldors'

leather clothing including coats, overalls, sleeves, capes and bibs, hand pads and aprons.
Latest Literature: Catalog "G".

» «

Knu-Vise, Inc.
2200 Eighth St., Detroit 16

Knu-Vise Model KL-450 Pliers

Products: Toggle-action pliers with tremendous holding pressure. A range of nine sizes meets all welding needs. Templates for all clamp models.
Latest Literature: Complete catalog.

» «

Krembs & Co.
669 W. Ohio St., Chicago 10

Products: 89 different "Fluxine" fluxes—one for every metal-joining operation. Each flux has its own properties and is designed for a specific operation such as gas welding, gas brazing, silver soldering, soft soldering, spelter brazing, metal-arc or spot welding. These fluxes are in powder, paste or liquid form. No. 2 "Fluxine" flux is especially recommended for brazing and bronze welding; No. 6 (non-glaring) for bronze bonding; No. 7 for welding all types of aluminum; No. 18 for gas and atomic-hydrogen welding of stainless steels and Inconel; No. 43 (non-glaring) whenever low-melting silver solders are specified.
Latest Literature: A chart showing the correct "Fluxine" fluxes to use on 57 different metals will be sent free upon request.

» «

Charles W. Krieg Co., Inc.
52-60 Dickerson St., Newark 4

Brazed with "Kre-Co" Aluminum Flux

Products: "Kre-Co" multichemic fluxes; aluminum brazing flux; brazing flux powder; brazing flux paste; aluminum welding flux; cast-iron flux.
Latest Literature: Catalog sheets; folder giving complete information on the Kre-Co aluminum brazing process and the uses of other Kre-Co fluxes.

» «

Lacey-Webber Co.
Kalamazoo 2, Mich.

Products: Interchangeable, ventilating-type insulating covers and electrode holders, 350 amp, weight 12 oz.

"Little David" Electrode Holder

Latest Literature: "Little David" illustrated catalog and price list.

» «

Lehigh Safety Shoe Co.
Allentown, Pa.

Protection Against Foot Hazards

Products: Safety shoes equipped with steel toe box and special soles to meet different underfoot conditions.
Latest Literature: Safety shoe catalog showing models and sizes; booklet "Lucky Toes—ten proofs of the pudding."

» «

Libby Welding Co.
2700 E. 13th St., Kansas City, Mo.

300 Amp Gas-Driven Welder

Products: Custom-built portable or stationary welders; complete welding and brazing service for any size of job, anywhere; metallizing sales and service; "G and O" radiator sales and service; stud welding; engineering service.

» «

The Lincoln Electric Co.
12818 Coit Rd., Cleveland 1

New "Shield Arc" S.A.E. Welder

Products: "Shield Arc" welders for manual welding; "Electronic Tornado" and "Lincolnweld" welders for automatic welding; full line of electrodes including "Fleetweld"; complete welding accessories.
Latest Literature: "Fleetweld" bulletin (manual welding); "Electronic Tornado" and "Lincolnweld" bulletins (automatic welding); "Weldirectory" (electrodes); "Shield Arc" bulletin (machines).

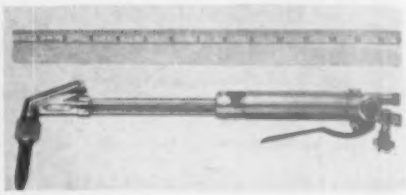
The Linde Air Products Co.
30 E. 42nd St., New York 17

"Oxweld" C-45, World's Largest Blowpipe

Products: Equipment and supplies for oxy-acetylene welding, cutting, for forming and treating of metals and for "Unionmelt" automatic electric welding.
Latest Literature: Booklet "Linde Oxy-Acetylene Processes"; "Oxweld" catalogs: No. 1 "Oxweld Blowpipes"; No. 2 "Oxweld Regulators"; No. 3 "Oxweld Cutting Machines"; No. 4 "Oxweld Acetylene Generators"; No. 5 "Oxweld Manifolds, Valves and Adaptors"; Oxweld welding rod and supplies price list.

» «

Liquid Carbonic Corp., Wall Chemicals Div.
3100 S. Kedzie Ave., Chicago 23



Gasweld "Featherweight" Cutting Torch

Products: Complete line of welding and cutting equipment and supplies; oxygen and acetylene gases; aircraft and standard welding torches; pressure regulators; welding and cutting tips; mould drying torches; arc welders; motor driven flame-cutting machines; soldering and brazing outfits; welding accessories.
Latest Literature: Catalog No. "144—Gasweld Welding and Cutting Equipment and Supplies"; price list.

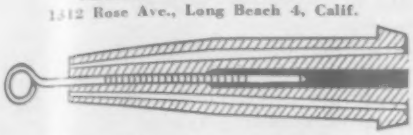
» «

Magnaflux Corporation
5900 Northwest Highway, Chicago 31

KH-2 Magnaflux Unit and XB-2A Powder Blower

Products: "Magnaflux" and "Magnaglo" equipment and materials for non-destructive magnetic-particle inspection of welds. "Zyglo" equipment and materials for non-destructive fluorescent-penetrant inspection of non-ferrous and austenitic welds for cracks and other surface flaws.
Latest Literature: Descriptive literature about equipment and materials for weld inspection. Reprints of articles.

Maitlen and Benson
1312 Rose Ave., Long Beach 4, Calif.



Non-Rusting "Wypo" Tip Cleaner

Products: "Wypo" tip cleaners for cleaning oxy-acetylene cutting and welding tips. Twelve stainless-steel cleaners of assorted sizes are supplied in a leather case.

» «

P. R. Mallory & Co., Inc.
3029 E. Washington St., Indianapolis 6

Mallory Standard Welding Tips

Products: "Elkonite" and other Mallory-developed alloys, available in spot-welding tips, holders and seam-welding wheels; also in welding discs, castings and forgings.
Latest Literature: The Mallory welding data book and Mallory resistance-welding catalog.

» «

Mall Tool Co.
7740 S. Chicago Ave., Chicago 19

Geared-Head Grinding Unit

Products: Flexible shaft grinders for weld grinding and for use by foundries and machine shops. Geared-head grinders are available with angle or straight hand spindles for every grinding application.
Latest Literature: Four-page circular describing Mall flexible-shaft grinders.

» «

Marquette Mfg. Co., Inc.
307 E. Hennepin St., Minneapolis 14

It's Easy with a
MARQUETTE
REGISTERED U.S. PAT. OFFICE
WELD-ALL
ELECTRODE KIT

Products: Marquette a-c welders; electrodes and electrode holders; arc torches and "Spatter Shield" for arc welding; Marquette acetylene generators and other welding supplies; Marquette "Weld-All" electrode kit with 12 electrodes of assorted sizes to meet various welding needs.

» «

Maurath, Inc.
R. F. D. No. 9, Cleveland 22

MAURATH
STAINLESS ELECTRODES

Products: Stainless-steel and heat-resisting, special-purpose welding electrodes.
Latest Literature: Price list only at this time.

» «

McGraw-Hill Book Co., Inc.
330 W. 42nd St., New York 18

389 pages, 152 illustrations, $4

Products: Technical engineering, industrial and business books. Recommended recent titles: Chute's "Electronic Control of Resistance Welding" ($4); Brooking's "Arc Welding Engineering and Production Control ($4); Kerwin's "Arc and Acetylene Welding" ($2.50); Curtis' "High Frequency Induction Heating" ($2.75).

» «

Metal & Thermit Corp.
120 Broadway, New York 5

A Full Arc-Welding Line

Products: A complete line of arc welding electrodes for mild steel, special alloy steels, stainless steels and hard-facing. Thermit and thermit equipment for repair and fabrication of large parts and for rail welding.
Latest Literature: "Murex" electrode catalog, "Thermit Welding" and other publications.

» «

Metallizing Engrng. Co., Inc.
38-14 30th St., Long Island City 1, N. Y.

Metallizing with Metco Equipment

Products: "Metco" metallizing equipment; "Fusebond" preparing units; metallizing wires, supplies and accessories.
Latest Literature: "Metco News" and other descriptive literature on the process and equipment.

» «

Metro Manufacturing Co.
38-11 31st St., Long Island City 1, N. Y.

Metro's Welding Goggle

Products: Goggles, helmets, hand shields, coverall goggles, torches and regulators.
Latest Literature: Catalog on request.

» «

Midland Paint & Varnish Co.
9119 Reno Ave., Cleveland 5

"NO-SPAT"
PREVENTS WELDING SPATTER

Products: "No-Spat," a non-toxic fluid to prevent welding spatter from adhering to metal surfaces. It also protects against rust, reduces fumes by 30% and maintains maximum welding strength.
Latest Literature: Engineering information on "No-Spat" welding fluid.

» «

Mine Safety Appliances Co.
Braddock, Thomas & Meade Sts., Pittsburgh 8

Combination "Skullgard" Welding Shield

Products: The M.S.A. combination "Skullgard" welding shield illustrated above, consisting of "Skullgard" hat plus a one-piece welding shield; "Fend-L," for skin protection against harmful welding rays; "Comfo" metal fume respirator, approved by U. S. Bureau of Mines; weldors' goggles; "Foille" burn treatment; first aid equipment.
Latest Literature: Descriptive bulletins and information on the above.

» «

Minnesota Mining and Mfg. Co.
900 Fauquier Ave., St. Paul, Minn.

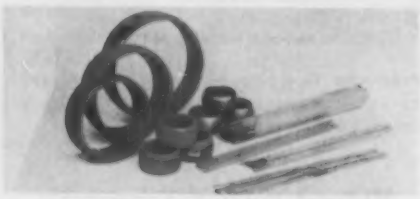
Products: "3-M" abrasive swing grinder belts, backstand belts, bench backstand belts, deburring belts; "Three-M-ite"

Weld Grinding with "3-M" Abrasive Belt

fibre combination discs; "3-M" abrasive specialty items; "Elek-tro-cut Three-M-ite" cloth.
Latest Literature: Descriptive folders.

» «

Mir-O-Col Alloy Co.
2416-60 E. 53rd St., Los Angeles 11



"Ni-Resist" Castings and Hard-facing Rods

Products: Hard-facing electrodes; oxy-acetylene hard-facing rods; castings of "Ni-Resist" alloy.
Latest Literature: "Weldor's Guide to Successful Hard-Facing" both in English and Spanish; procedure sheets for hard-facing plowshares, grader blades, tractor running gears, solid shafts and wash pipes.

» «

Modern Engineering Co., Inc.
3401-15 Pine Blvd., St. Louis 3

"Weldmaster" Standard Welding Torch

Products: Meco "Weldmaster" welding torches; "Cutmaster" cutting torches; "Safe-T-Check" regulators; "Tripl-Flint" lighters; "Little Pal" generators; complete line of Meco welding and cutting equipment and accessories.
Latest Literature: Meco general catalog No. 120; Meco service bulletin and Meco No. 108 parts list.

» «

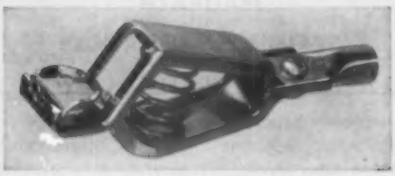
Moslo Machinery Co.
2443 Prospect Ave., Cleveland 15

16-Ton Laboratory Extrusion Press

Products: Complete laboratory or production equipment for the manufacture of welding rods and electrodes.
Latest Literature: Literature on Moslo welding rod processing plant, Moslo automatic rod feeder, "Shiftweight" reels, Moslo welding rod brushing machine.

» «

Mueller Electric Co.
1583 E. 31st St., Cleveland 14



"Big Brute" Ground Clamp

Products: A solid copper, 300 amp welding ground clamp.
Latest Literature: Sheet No. 856.

» «

Mullenbach Electrical Mfg. Co.
2300 E. 27th St., Los Angeles 11

"Arctrol" D-C Welder Controller

Products: "Arctrol," a foot-operated d-c welder controller for use with Lincoln, General Electric, P & H Hansen, Wilson and Hobart welders.
Latest Literature: "Arctrol" descriptive sheets.

» «

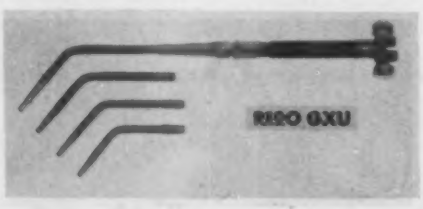
John Nageldinger & Son, Inc.
409 E. 91st St., New York 28

Nageldinger Style "N" 608 Regulator

Products: Cylinder valves; cylinder manifolds and regulators; needle valve controls; welding and cutting equipment; pressure regulators; safety valves; compressed gas apparatus.
Latest Literature: Welding and cutting apparatus catalog; medical oxygen apparatus catalog.

» «

National Cylinder Gas Co.
205 W. Wacker Dr., Chicago 6



GXU Tips with Welding Torch Handle

Products: Just added to the "Rego" line of regulators, welding and cutting torches, tips, etc., is the new GXU series of welding tips made to fit the standard "Rego" GX handle. One full-range mixer fits all eleven sizes of these tips.
Latest Literature: Circular NR-116.

» «

Nelson Specialty Welding Equipment
440 Peralta Ave., San Leandro, Calif.

"Cut-in-half" Stud Weld

Products: Equipment for automatically end welding flux-filled studs of all diameters from 3/16 to 3/4 in. Many special shapes and styles of studs are available. Studs are welded with pistol welding gun, and production units are available for 20 to 25 welds per minute.
Latest Literature: Catalog and price list; "Physical Properties Data Sheet"; "Stud Welding Production Units."

» «

Norton Company
1 New Bond St., Worcester 6, Mass.

Norton Weld Grinding Wheels

Products: Complete line of grinding wheels for weld grinding; "Norflex" polishing wheels; abrasive grain for polishing.
Latest Literature: "Norton Abrasives for Portable Grinders."

» «

North American Philips Co., Inc.
100 E. 42nd St., New York 17

New Portable X-Ray Tube

Products: Industrial and medical X-ray equipment, quartz crystals, electronic tubes, diamond dies, fine wire, tungsten and moly powder, rods, wire and sheets.
Latest Literature: "X-Ray Diffraction"; "Radiography and Fluoroscopy Wire Handbook."

Northeast Metals Co.
4124 Torresdale Ave., Philadelphia 24

"Nemco" Weld Filler

Products: "Nemco" weld filler is used over electric welds on cast iron. It seals all leaks and will withstand a pressure of 70 psi.
Latest Literature: Sample and circulars are available.

» «

NuSteel Company
1714 S. Ashland Ave., Chicago 8

Removing Heat Tint from Stainless Steel

Products: "Nu-Steel" (liquid or paste) for removing heat tint, cleaning, polishing and finishing stainless steels, Monel, aluminum, bronze, copper and brass.
Latest Literature: Instruction bulletins for power and manual operation.

» «

Oakite Products, Inc.
56F Thames St., New York 6

OAKITE

METAL CLEANERS

Products: Specialized Oakite surface preparation of aluminum before spot welding; other Oakite materials for cleaning metals before and after welding.
Latest Literature: Digest of process for surface preparation of aluminum and aluminum alloys for spot welding.

» «

The Ohio Carbon Co.
12508 Berea Rd., Cleveland

Products: Carbon brushes for all makes of d-c welding generators.
Latest Literature: Complete listing by maker's name and part numbers.

Ohmite Manufacturing Co.
4835 Flournoy St., Chicago 44

Ohmite Rheostats

Products: Rheostats for accurate, smooth, close welding control. Uniform or taper-wound in wide range of types and sizes to meet every need.
Latest Literature: Industrial catalog and engineering manual No. 40 available to manufacturers.

» «

Optimus Detergents Co.
248 Church St., Matawan, N. J.

OPTIMUS

PRE-CLEANERS—DEOXIDIZERS

Products: Optimus aluminum pre-cleaner and deoxidizers. Their use permits the production of low surface resistance on aluminum preparatory to spot welding.
Latest Literature: Special data bulletin.

» «

Peterson Welding Laboratories
1423 Virginia, Kansas City 6, Mo.

Peterson Fluxes for Metals

Products: Peterson's No. 1 "Blue Flux" has a cleaning and bonding effect on malleable iron; No. 2 "High Heat Flux" will clean and flow to rusty, dirty or sandy castings; No. 3 "Special Flux" flows at a very low heat when a small, long needle flame is used for water jacket brazing, etc.
Latest Literature: Free samples and literature are available.

» «

C. E. Phillips & Co.
2750 Poplar St., Detroit 8

Dies Welded with Phillips "600" Electrode

Products: Welding electrodes and specialties; 145 different kinds (not sizes) of welding rods and electrodes are carried in stock.
Latest Literature: "4 Ways to Salvage, Reclaim and Conserve Iron Castings by Electric Arc Welding"; "Arc Welding in the Maintenance and Construction of Tools and Dies."

» «

Picker X-Ray Corp.
300 - 4th Ave., New York 10

5 to 50 Kv X-Ray Unit

Products: X-ray apparatus for all types of welding inspection and control; 5 to 250 kva X-ray units.
Latest Literature: Bulletin No. 1345, 5 to 50 kv X-ray units; bulletin No. 1743, 150 kv X-ray units; bulletin No. 1144, 250 kv X-ray units.

» «

Progressive Welder Co.
3050 E. Outer Dr., Detroit 12

250 Kva Hydraulic Flash Welder

Products: The "Progressive" line of resistance-welding equipment includes spot welders, welding guns, flash welders, press welders, aluminum welding equipment, battery-powered welders, battery power packs, pressure switches, welding cables, hydraulic pressure boosters and welding fixtures.
Latest Literature: "Welding at Work" No. WP-44; "How and Why of Battery Welding" No. 902; "Progressive Flash Welders" No. 203.

» «

Punch-Lok Co.
321 N. Justine St., Chicago 7

Punch-Lok Spliced Welding Cable

Products: The combination of "Punch-Lok" clamps and "Loking Tool" splices welding cable in a fast, safe, economical manner. It also ties, reinforces, connects, mends, etc.

Latest Literature: New general catalog and folder on electrical applications.

» «

Radiant Lamp Corp.
300 Jelliff Ave., Newark 8

Radiant
SPATTERPROOF LAMPS

Products: "Spatterproof" lamps of special glass for welding; weatherproof lamps for outdoor illumination; spotlights; floodlights; general lighting lamps; projection lamps.
Latest Literature: Folder describing Radiant "Spatterproof" lamps and giving sizes and prices.

» «

Rankin Manufacturing Co.
3072 W. Pico Blvd., Los Angeles 6

"Ranite" on Oil-Field Drill Collar

Products: Ranite hard-facing electrodes. Deposit hardness of type "A" is 25 to 30 Rockwell C; of hardness type "C" 60 to 62 Rockwell C and of hardness type "B" 45 to 50 Rockwell C.
Latest Literature: Price sheet and general information pertaining to Ranite electrodes and some recommended applications.

» «

The Reid-Avery Co., Inc.
Dundalk, Baltimore 22

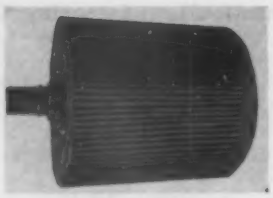
Better Work . . . Lower Costs

Products: "Raco" heavily coated electrodes and oxy-acetylene rods—comprise a complete and superior line to meet every welding need. The high quality of "Raco" products permits fine welds at great speed, regardless of the type of job.
Latest Literature: Illustrated booklet gives full information on every "Raco" product.

» «

Resisto-Loy Co.
127 Baylis St., S. W., Grand Rapids 7

Products: "Two-Tone" alloys, "Resisto-Loy," "Isorod" "Tungalloy" and



Crusher Roll Rebuilt with "Manga-Tone N. M."

"Manga-Tone N. M" for hard-facing and rebuilding worn parts.
Latest Literature: Bulletin No. 7, "How to Use Hard-facings"; "Resisto-Loy Hard-facings."

» «

Rex Welder & Engineering Co.
7 E. 19th St., Kansas City 8, Mo.

REX
HEAVY DUTY SPOT WELDER

Products: Resistance-welding equipment including spot welders, butt welder attachments, transformers, electrodes and air cylinders. Bench model spot welders, rocker arm and press types, in 2½, 5, 7½ and 10 kva ratings.
Latest Literature: Loose-leaf bulletins describing spot welders for most every type of job.

» «

Reynolds Metals Co., Alum. Div.
2500 S. 3rd St., Louisville 1

Seam Welding Aluminum

Products: Aluminum ingots, sheets, plates, wire, rods, bars, shapes, tubing, forgings, castings fabricated parts, foil, pigment, insulation.
Latest Literature: Literature on products may be obtained from Reynolds offices located in principal cities.

» «

Sciaky Bros.
4915 W. 67th St., Chicago 38

225 Kva Sciaky Flash Welder

Products: Complete line of resistance-welding machines for alloy steels, mild steels and aluminum; spot welders, seam welders, portable welders, projection welders, flash and butt welders.
Latest Literature: Manuals 101C, 105B, 106A, 112B, 113A, 120A, E7C.

» «

Sellstrom Mfg. Co.
615 N. Aberdeen St., Chicago 22

Adjustable Fibre Cover for Goggles

Products: The new, lightweight cover shown is designed to fit over every type of corrective spectacle and is adjustable to fit the facial contour. Shielded vents prevent fogging. This is one of a complete line of products including goggles, helmets, lenses, shields and respirators.
Latest Literature: Folders on accident facts and prevention

» «

The Seymour Mfg. Co.
Seymour, Conn.

Seymour Phosphor-Bronze Welding Rods

Products: Seymour phosphor-bronze rods are capable of highest grade performance with regard to deposition, penetration, ductility and tensile strength. Made in grades A, C and D and available through all welding supply sources.

» «

Shawinigan Products Corp.
350 - 5th Ave., New York 1

Shawinigan Calcium Carbide

Products: Shawinigan carbide for oxy-acetylene welding and cutting, miners' cap and hand lamps, house lighting and cooking. Over 40 years' experience and the finest raw materials obtainable go into the manufacture of this product.

» «

Sight Feed Generator Co.
14 N. 10th St., Richmond, Ind.

Products: "Sight Feed" acetylene generators, "Rexarc" a-c welders, "Rexaloy"

Sight Feed Portable Acetylene Generators

overlay electrodes and accessories.
Latest Literature: Sight Feed catalog No. 44-G; Rexaloy electrode catalog No. 1-RX.

» «

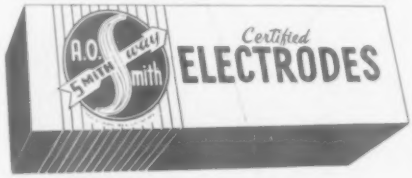
Skilsaw, Inc.
5033 Elston Ave., Chicago 30

"SkilShear" Cuts 16 Gauge Metal

Products: Portable electric "Skil" tools: saws, drills, grinders (bench, hand and spindle types), sanders (belt, disc and floor types),blowers and the "SkilShear" illustrated.
Latest Literature: Catalog No. 45 with a special section on care and maintenance of portable electric tools.

» «

A. O. Smith Corp.
3253 N. 27th St., Milwaukee 1



Made by Welders . . . For Welders

Products: More than 320,000 "Smithway" electrodes are used every day in A. O. Smith plants, and millions more are shipped around the world to produce better welding at lower cost. For mild, high-tensile and stainless steels.
Latest Literature: Smithway certified electrode catalog.

» «

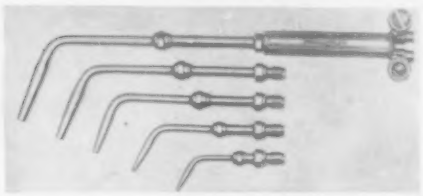
G. W. Smith & Sons
109 S. Sperling Ave., Dayton 3

PROTECT-O-METAL
CUTS CLEAN-UP TIME 90%

Products: Manufacturers of "Protect-O-Metal" arc-welding compound. This product prevents spatter sticking, quiets and stabilizes the welding arc and improves fusion. It causes no fumes, smoke or odors.
Latest Literature: Six-page folder describing uses and advantages of "Protect-O-Metal."

» «

Smith Welding Equipment Corp.
2633 - 4th St., S. E., Minneapolis 14



Smith's "Lifetime" Welding Torch

Products: Oxy-acetylene welding and cutting equipment, torches, regulators, acetylene generators, a-c arc welders, fluxes and miscellaneous supplies.
Latest Literature: Catalogs, broadsides, booklets on conservation of welding and cutting torches and regulators, consumption charts, etc.

» «

S-M-S Corp.
1165 Harper Ave., Detroit

POINTS TO BETTER WELDING

Products: Ejector-type "Adjust-A-Cold" holders for spot welders; seam welder wheels; projection and flash welder dies; special alloy forgings and castings; unusual alloys for unusual applications.
Latest Literature: Complete catalog, "Steps to Better Welding."

» «

Special Welding Alloy Co., Inc.
27-33 Jackson Ave., Long Island City 1

ARC WELDING ELECTRODES
OXY-ACETYLENE RODS
AND FLUXES

Products: Complete line of oxy-acetylene welding and brazing rods and fluxes, silver-brazing alloys and fluxes, electrodes, welding and cutting equipment and welding accessories.
Latest Literature: Descriptive catalog No. 11.

» «

Standard Machinery Co.
1473 Elmwood Ave., Providence 7

"Standard" Welding Positioner

Products: Multipurpose welding positioners, completely powered for handling work up to 700 lb.
Latest Literature: New catalog on the "Standard" welding positioner.

» «

Superior Flux Co.
913 Public Square Bldg., Cleveland 13

Three Popular "Superior" Fluxes

Products: Complete line of fluxes for welding, brazing, silver soldering, soft soldering and low-temperature welding. Fluxes for the entire range of ferrous and non-ferrous metals and alloys ordinarily used in industry.
Latest Literature: Catalog No. 44, a combined catalog, price list and guide to the selection of the right flux.

» «

Superior Mfg. Co.
913 Public Square Bldg., Cleveland 13

"Bantam Bully" Air Hammer

Products: "Bantam Bully" air hammer. By changing tools, it can be used for cleaning, chipping, descaling, peening or routing. It weighs 1¼ lb, delivers 13,000 blows per minute and has only one moving part.
Latest Literature: Descriptive bulletin on request.

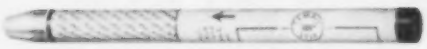
» «

Taylor-Wharton Iron and Steel Co.
High Bridge, N. J.

"Timang" Air-Toughening Welding Rods

Products: "Timang" manganese-nickel steel electrodes for the reclamation of manganese steel castings and for abrasion-resisting overlays.
Latest Literature: Bulletins, "Welding Manganese Steel" and "A New Nickel Manganese Steel"; price list on welding products.

Tempil° Corp.
132 W. 22nd St., New York 11



"Tempilstik°" to Signal Working Temperatures

Products: "Tempilstik°," "Tempilaq°" (liquid) and "Tempil°" pellets signal proper working temperatures. Especially useful in black-heat ranges.
Latest Literature: Tempil° preheating chart, Tempil° scale for weld bend testing, Tempil° catalog.

» «

Templeton, Kenly & Co.
1020 S. Central Ave., Chicago 44

"Util-A-Tool" Holds Parts for Welding

Products: The Simplex "Util-A-Tool" maintenance set for pulling, pushing, spreading, bending, clamping, lifting. It is widely used in welding work. Also a complete line of jacks.
Latest Literature: Bulletin P and P 45 on "Util-A-Tool"; catalog No. 44 on Simplex jacks.

» «

Thomson-Gibb Elec. Welding Co.
161 Pleasant St., Lynn, Mass.

Thomson F-5A 300 Kva Flash Welder

Products: Spot welders, seam welders, flash and butt welders, resistance welders for special production.
Latest Literature: Thomson-Gibb "Flashes," a monthly bulletin of news, ideas and information about production welding.

» «

Titanium Pigment Corp.
111 Broadway, New York 6

TITANOX
TITANOX
REG. U. S. PAT. OFF.

Titanium Dioxide for Electrode Coatings

Products: "Titanox-A" (titanium dioxide) contributes to increased working speed, production of more protective slag and a finished job of greater tensile strength and ductility.

» «

Tube Turns, Inc.
Louisville 1

Tube-Turn Seamless Welding Fittings

Products: Shown here are representative "Tube-Turn" welding fittings and flanges from a line of more than 4,000 items. "Tube-Turn" fittings assure minimum flow resistance, lessen weight, are quickly installed and easy to insulate.
Latest Literature: Catalog No. 111.

» «

Tweco Products Co.
English at Ida Sts., Wichita 1

Tweco "Redhead" Ground Clamps

Products: A complete line of ground clamps, electrode holders, cable connectors, machine terminals and mechanical "Twecolugs." Everything that goes on a welding cable.
Latest Literature: The 1945 "Twecolog" describes the line and includes a quantity price and parts list.

» «

Una Welding, Inc.
1615 Collamer Ave., Cleveland 10

Unamatic "Concealed Arc" Equipment

Products: "Unamatic" arc-welding equipment for: "Open Arc" welding using light-coated wire; "Protected Arc" welding using light-coated wire and tape and "Concealed Arc" welding using light-coated wire with granular flux.
Latest Literature: Catalog and bulletin, "How to Select Equipment for Unamatic Arc Welding."

» «

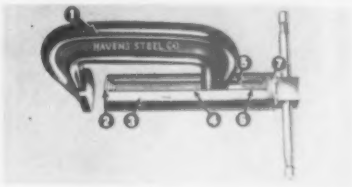
United Blower Co., Inc.
193 Centre St., New York 13

Products: Portable blowers for exhausting welding fumes. Sizes range from ½ to 1 hp, capacities from 250 to 980 cfm.
Latest Literature: W-1 folder describes unit and lists capacities and prices.

Portable Ventilating Set

» «

United States Steel Supply Co.
1319 Wabansia Ave., Chicago 90



Havens Protected "C" Clamp

Products: The welding clamp shown is available in a large assortment of sizes. It has high-tensile strength and will stand abuse. The end cannot turn, and a strong compression sleeve protects the threads from weld spatter. The screw never takes any stress below top of clamp and so cannot buckle or bend. Long guide keeps compression sleeve in alignment.
Latest Literature: Illustrated circular with complete information.

» «

Universal Welder Corp.
760 Carnegie Ave., Cleveland

"Black Magic" and "Silver Magic" Fluxes

Products: "Black Magic" flux for hard-facing; "Silver Magic" flux for silver soldering. These are both new products. Midget automatic spot welders, bench size with electronic timer.
Latest Literature: Detailed circulars available on request.

» «

Victor Equipment Co.
844 Folsom St., San Francisco 7

VICTOR

Manufacturers of Fine Welding and Cutting Apparatus

Products: Welding and cutting torches in

(Please turn to page 70)

Jobbers Wanted!

To established jobbers, the new Black Arrow line of Gas Cutting and Welding Apparatus offers many advantages. Here are just a few:

1st As a Black Arrow Jobber, you are backed by a young, progressive organization that believes the welfare of its jobbers to be its first obligation and prime responsibility.

2nd You enjoy the benefits of a sales policy which is unique in the welding industry. This policy, outlined in our Sales and Distribution Policy Booklet, is so administered that it always works to your advantage and best interests.

3rd You carry a standardized line of high quality products which combine reliability with universal application. This line will be constantly improved and expanded.

4th You receive cooperation and support on matters of local and national advertising and sales promotion.

5th You receive the competent advice and assistance of Black Arrow Field Engineers whose entire efforts are devoted to serving your interests.

If you're an established jobber who may be seeking a new source of supply, now or in the future, write us today. One of our Field Engineers will be glad to meet with you and describe our proposition in detail.

BLACK

The BLACK MANUFACTURING CO.

1416-1428 W. BALTIMORE ST., BALTIMORE 23, MD.

FORMERLY THE ALEXANDER MILBURN CO.

PIONEERS IN GAS CUTTING AND WELDING APPARATUS SINCE 1907

VICTOR EQUIPMENT—Cont.
all sizes; pressure regulators for all cylinder gases; cylinder manifolds in all capacities.
Latest Literature: New 104-page, four-color, illustrated apparatus catalog (Form 23).

» «

Watchemoket Optical Co.
Providence 3, R. I.

All-Plastic Safety Goggles

Products: Inexpensive all-plastic safety goggles in models and sizes for many uses. Excellent for chipping, grinding, etc. These goggles are available with dark lenses and side shields.
Latest Literature: Watchemoket catalog.

» «

Wayne Chemical Products Co.
9602 Copeland Ave., Detroit 17

"SPATTER EX"
"FLASH EX"
"MELTOMATIC"

Products: "Spatter Ex" for preventing the hardening of welding spatter; "Flash Ex" for preventing the hardening of welding flash and spatter. Other products include "Meltomatic" paste solder for tinning and soldering, spray booth cleaners, lubricants, grinding and cutting compounds.
Latest Literature: Folder, "The Wayne-Way."

» «

Welding Engineering Co.
264 E. Ogden Ave., Milwaukee 2

"MAJOR"
WELDING CABLE—

Sizes: #6 to 4/o
Amps: 75 to 550

Products: "Major" welding cable is superflexible, rubber-covered, waterproof cable having high tensile strength; sizes 6 to 4/0, 75 to 550 amp. "Admiral" power cable comes in two, three, four and special three conductor types; sizes 18 to 6. Underwriters' appoved.
Latest Literature: New brochure in preparation.

» «

Martin Wells
5886 Compton Ave., Los Angeles 1

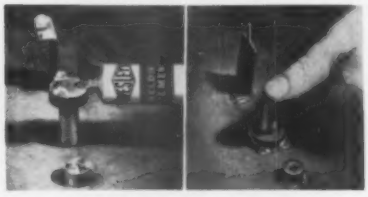
Products: Martin Wells electrode holders. The "Stubby" model illustrated has a

More Arc Time

new "Mitt-Grip" collar to facilitate rod changing and a high-pressure grip that holds the rod at the tip.
Latest Literature: Broadsides giving full descriptions, parts and prices.

» «

Wesley Lacquer Co.
94 - 4th St., Brooklyn, N. Y.



Wesley's Welding Cement

Products: Welding cement for holding work to small fixtures. The fixture is stuck fast in 5 seconds, ready for the weldor. Better, faster welding can be done in tight, awkward places.
Latest Literature: No literature available —will furnish sample.

» «

Westinghouse Electric Corp.
Pittsburgh 30

Westinghouse "Flexarc" Welder

Products: A-c and d-c arc welders and multiple-operator arc welders; welding electrodes—complete line of mild and alloy steels; automatic arc welders; welding accessories; phos-copper for brazing; resistance welder controls.
Latest Literature: D-c welders, Nos. 26-100, 100-1, 100-2, 100-3, 100-4; a-c welders, 26-325, 326, 350; a-c welders, "1,000 Amperes for Automatic Welding," 26-360; multiple-operator welders, 26-200; electrodes for mild-steel welding, 26-641, -642, -643, -644, and B-3353; accessory catalog, 26-620; "Phos-Copper for Brazing," B-3201; "Common Welding Problems," B-3326; "Facts about Electronic Control for Resistance Welders," B-3102.

» «

Will-Weld Mfg. Co., Inc.
600-620 S. 15th St., Omaha

"E-Z" Ground Clamp

Products: Complete line of welders and accessories, ground clamps, welding clamps, face shields, etc.
Latest Literature: Catalog sheets available on all items.

» «

The Wolfe-Kote Co.
705 Center Ave., Sheboygan, Wis.

Tri-Flux
TRIPLE DUTY FLUX

Products: "Tri-Flux," a triple-duty flux that cleans, removes rust and fluxes; "Anti-Spatter," a product to shield work from weld spatter; "Tip-Cleen," a solution for cleaning welding and cutting torch tips.
Latest Literature: Leaflets describing these products.

» «

Wooldridge Alum. Welding Prod.
9 Naubuc Ave., Glastonbury, Conn.

Alflux No. 1; Brazing Flux; Alflux No. 2

Products: Aluminum welding fluxes; brazing flux; complete line of electrodes; stick solder; gas welding rods.
Latest Literature: Booklet; literature on aluminum welding products and brazing materials.

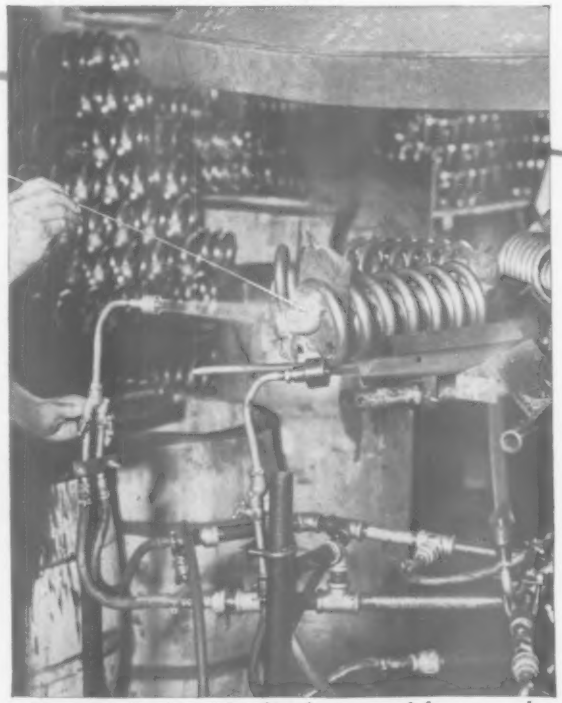
If Your Copy Is Late---

We know that you're impatient to receive THE WELDING ENGINEER each month, and we don't blame you—we think it's a pretty good magazine ourselves. So we surely hope that you receive this issue on time, but frankly we're keeping our fingers crossed. It's one of the largest issues we ever put out, and, even though the war is over, printers are still forced to work under wartime production conditions. So if your copy *is* late, Mr. Subscriber, will you forgive it, please? Honestly, we did everything within our power to get it to you on time.

Two brazing operations are required for each gas-type circulating water heater, joining the inner and outer coils to the two pipe castings—make four Phos-Copper joints in each.

NOW...3200 JOINTS PER DAY BRAZED WITH PHOS-COPPER

...a tip to design engineers!



The coil being brazed has just been rotated from two other positions where gas flames preheated the joints. The flame at the brazing position maintains the heat and flows the ⅛-inch Phos-Copper rod. The ten-position rotating fixture produces 1600 brazing operations of two joints each, or 800 coil assemblies per shift.

You get high production speed—and eliminate costly machining time—when you use Phos-Copper brazing. With this process, many cast and machined parts are being replaced by structures built up from simple, easily produced components.

With Phos-Copper brazing of copper, bronze and brass, tests have shown joints stronger than the parent metal...corrosion resistance equaling the parent metal . . . electrical conductivity 98% as great. Its low, free-flowing temperature permits the brazing of light sections.

Phos-Copper brazing may be done in any of five ways—by gas, incandescent carbon, dipping and electronic heat and in a furnace. Phos-Copper comes in rod, strip and special shapes.

Because of the many advantages, Phos-Copper is replacing tin and silver-base solders. For further information on Phos-Copper, ask your Westinghouse representative for book B-3201. Or write for it, to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-90556

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Phos-Copper Brazing

On the Job

Underwater Welding Photoed

UNDERWATER arc welding and cutting operations are usually done "in the dark" as no one except the diver or a companion has been able to see them. Now, for the first time so far as known, underwater arc welding has been caught by the lens of a camera. The accompanying picture was taken through a porthole in the specially designed tank used to train weldors in underwater welding and cutting in the mechanical division of the Panama Canal Zone Authority.

The diver is R. L. E. Cook, welding engineer for Armco International Corp., who is arc welding under 15 ft of water. A mild-steel electrode having a special waterproof coating is used for this work.

Courtesy, The Lincoln Electric Co.

For the first time, the camera sees underwater arc welding. Many damaged war vessels have been successfully salvaged by this process.

» «

World's Largest Seam Welder

SPEEDS as high as 300 welds per minute can be obtained in 0.032 in. aluminum sheets with the world's largest seam welder, located at the New Kensington plant of the Aluminum Co. of America. Electronic controls charge as many as 84-120 mfd capacitors (10,080 mfd) from 1,500 to 3,000 volts with a peak demand of 100 kva on a three-phase system. Each time this charge is "dumped" into the welder transformer, a weld is made. The electronic controls for the capacitor-discharge system assure the right amount of current for consistent welding results on sheet aluminum from 0.032 to 0.187 in. thick.

The operator's adjustment panel may be seen in the accompanying picture conveniently mounted next to the big seam welder. The main control cabinet (not shown) houses the rectifier, voltage-regulating system and part of the capacitor bank. The balance of the capacitor bank is housed in another cabinet.

Courtesy, Westinghouse Electric Corp.

This big seam welder has the distinction of being the largest of its type in the world. It is owned by Aluminum Co. of America.

» «

Lance Cutting Huge Casting

FACED with the problem of scrapping a 100 ton steel casting, a metalworking plant found that the usual method of disposing of scrap material would be prohibitive in cost. It was decided to try the oxygen lance, which can sever metal of practically any thickness. The results obtained were so satisfactory that the company later used the same method to dispose of two other castings, each weighing 17½ tons.

The lancing operation on the 100 ton casting was begun in defiance of the snow and subzero temperatures prevailing at the time. Lancing was started about 28 in. below the top of the casting, at a point 5 ft thick. A hole was lanced completely through, and the cut was then continued to the bottom of the casting. During this operation the lance was held at an angle to allow the slag formed from the cutting

Welding helped in innumerable ways to build the mighty navy that smashed the Japs. Here are two applications of welded fabrication for warships at Lukenweld, Inc., division of Lukens Steel Co., Coatesville, Pa. On the left a 2,000 hp, 16 cylinder Diesel-engine frame is being made by welding flame-cut and formed parts. These, frames developed 15 years ago, have revolutionized Diesel-engine construction. The big ring shown on the right is an antiaircraft gun mount for a U. S. Navy warship.

Courtesy, The Linde Air Products Co.

A 100 ton steel casting being cut up for scrap with an oxygen lance. At some points the lance had to cut through steel 5 ft thick. Three completed lance slots are clearly visible. The workmen standing on the casting are making a supplemental cut with a flame-cutting machine.

to run out of and away from the face of the cut.

When the required number of lance slots had been completed, the remaining web of material at the top of the casting was severed by a standard flame-cutting machine. The resulting slabs, measuring 3 by 6 by 5 ft, were then cut again with the flame-cutting machine into suitable sizes for shipment.

» «

Enlarging Storage Tanks

A METHOD by which liquid storage tanks may be enlarged to as much as twice initial size without dismantling the original structure has been developed by the Stacey Bros. Gas Construction Co., Cincinnati. The patented process makes use of virtually all of the original structure in assembled form. The method is said to be particularly useful where facilities are crowded and the only room for expansion is upward.

As much as 100% additional storage capacity may be added. Stacey men cut the existing tank shell at the base, weld new radial plates and build a new shell around the old structure to give the desired height. Water is then run into the new shell and compressed air is introduced to float the old shell up to the new level. Various controls hold the inner tank steady and level to ⅛ in. Filler plates 4 in. thick are inserted between the old and new shells, and the two units are tack welded together. Air pressure is released and the water drained from the tank. The two shell sections and the fillers are then completely seal welded on the outside. Inside, the old shell is trimmed and welded at intervals around its circumference, and the enlarged tank is ready for connections and service.

Originally developed to obtain better buoyancy control of petroleum storage tanks in areas subject to flood, the method can be used to build up tanks having either umbrella-type roofs or roofs supported by center columns.

BUY VICTORY BONDS

TITAN

Bronze Welding Rods

for

Strong, TOUGH welds

★The outstanding factor in the recognized superiority of Titan Welding Rods is Double Deoxidation, a process exclusively Titan. By this method of manufacture the rod is kept definitely free of occluded and dissolved gases, and no gases are absorbed from any source during the welding operation. Free flow, full penetration, non-porous structure and great bonding strength and toughness are the results.

Titan Welding Rods include many analyses, each designed for a certain group of metals, although all Titan Rods do a good job on all metals with melting point above 1650°F. Write for literature which will enable you to select the best rod for your purpose.

IMMEDIATE SHIPMENTS

Titan

METAL MANUFACTURING CO., BELLEFONTE, PA.

Sales Offices:

New York—39 Cortland St.

Chicago • San Francisco • New Orleans

Export Office—70 Pine St., New York 5, N. Y.

Quality Alloys By Brass Specialists

Brass and Bronze Rod • Forgings • Die Castings • Welding Rods

Weld Fighting Lady

ARC welding played a vital part in effecting emergency repairs on the USS *Intrepid* when this four-time victim of Jap air action was hit by a suicide plane off Okinawa. The Kamikaze plane carrying a 1,200 lb bomb crashed through the flight deck of the carrier and exploded on the hangar deck. In 45 minutes a temporary patch 15 by 20 ft had been welded on the flight deck, enabling the planes in the air to land before they ran out of fuel.

The *Intrepid*, which had been battered into flames by Jap planes three times before, made her fourth trip back for battle damage repairs. At a West Coast navy yard, a "civilian navy" restored her to fighting trim. One of the signs which served as a constant reminder to the shipyard workers was situated at the brow leading up the carrier (see picture). The sign read: "This Fighting Lady has a date in Tokyo. Don't make her late." The workers took the hint, and the *Intrepid* was able to keep her Tokyo appointment.

In action for the Okinawa campaign, pilots of the USS Intrepid helped send the 45,000-ton battleship Yamato to the bottom. Later, while her airmen were carrying the war to Japan's home islands, the carrier was hit for a fourth time by one of five attacking suicide planes. Note the sign which stimulated shipyard workers to speed repairs.

Official U. S. Navy Photo, Courtesy The Lincoln Electric Co.

» «

Repair Vise Support

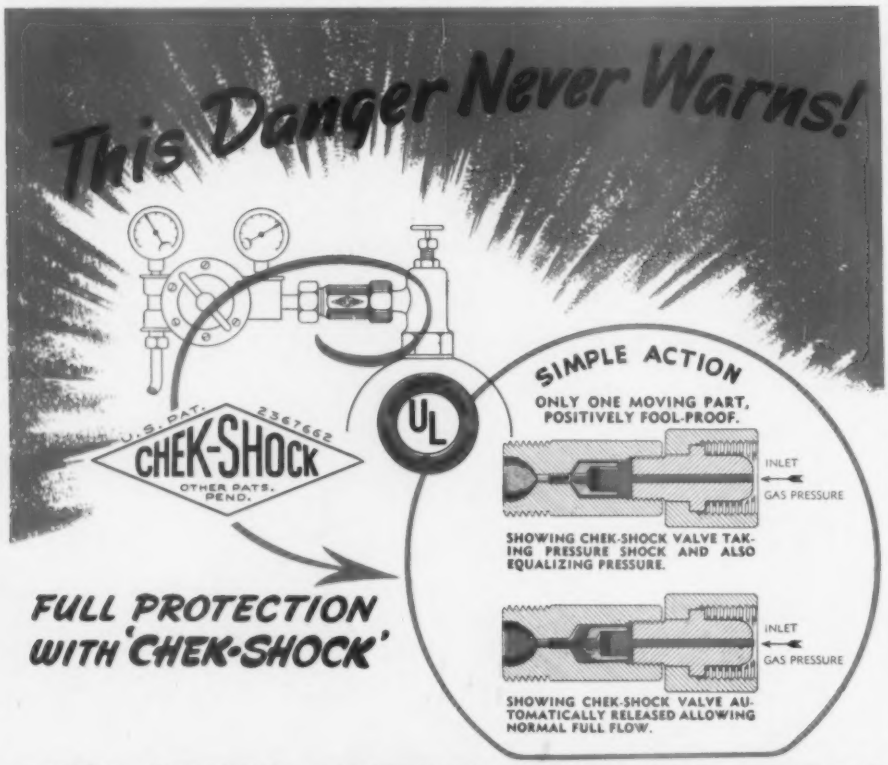
By Elton Sterrett

A MACHINIST'S VISE with 4 or 5 in. jaws is a necessity on any construction job, but it is frequently a problem to find a place to mount it where it can be conveniently used for heavy work without too much preliminary anchoring.

One construction foreman provided a unique vise bed upon the welded rack supporting drums of lubricants. To build the rack, two pieces of 4 in. pipe were notched by the cutting torch to fit the curve of the drums. These lengths of pipe were extended 16 in. beyond the vertical support members at on end of the rack, and the weldor then fastened a piece of ¾ in. boiler plate across the two pipe ends. The vise was mounted on the shelf thus formed, the location being chosen so that it could be swung through 90 deg to accommodate either long or wide work.

Serving to tie the horizontal pipes together at the end, the welded shelf is a permanent part of the oil-drum skid. It protects the drums from contact with other materials when they are being transported by truck.

A handy support for a machinist's vise was provided by welding a piece of ¾ in. plate across the two lengths of 4 in. pipe on which the oil drums rest.



CHEK-SHOCK OXYGEN CUSHION VALVE

SOFTLY controls the vicious "jolt" of high pressure oxygen gas, thus eliminating regulator repairs and preventing possible injury to operators.

- **Will allow tank valve to be opened rapidly without damage to regulator or danger to operator.**
- **Will increase life of regulator assembly.**
- **Will eliminate possible injury to operator from burstings.**
- **Will prevent unnecessary internal wear in regulator *(as NOT necessary to release control screw before opening tank valve).***

This PROVEN automatic safety device cushions the initial "blast" of pressure when tank valve is turned on. (this uncontrolled surge which strikes like a hammer is the direct cause of most damaged regulators and accidents), when pressure slowly bleeds and equalizes then CHEK-SHOCK allows a full flow of oxygen.

PRICE IS LESS THAN ONE REPAIR BILL

 # 1. STANDARD COUPLER—for all standard size welding type oxygen regulators.
 # 2. LIGHT COUPLER—for "airplane" or soldering size oxygen regulators.
 # 3. HEAVY DUTY COUPLER—recommended for extra heavy duty work only.
 # 4. SCREW TYPE COUPLER—for removable inlet stem regulators (¼" pipe) available in standard, light, or heavy capacities.
 # 5. FOR HYDROGEN—left hand thread coupler. We also make Medical Chek-Shocks for all types of medical regulators and tank fittings (chrome plated).....$7.00 each

$6.00 ea.

SEE YOUR DISTRIBUTOR OR WRITE

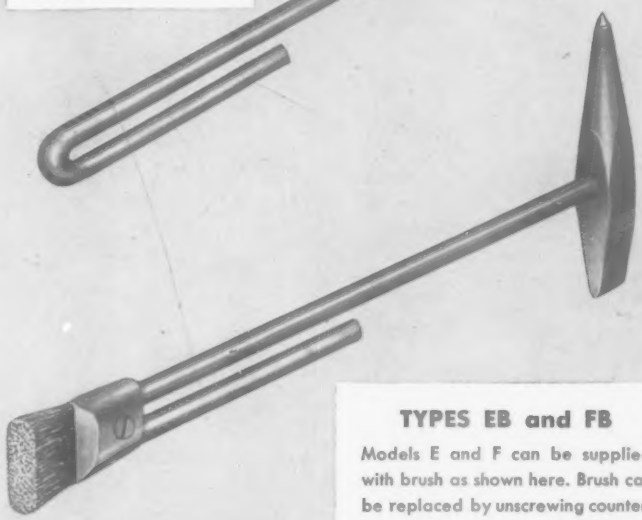
Chek-Shock MFG. CO.
FOWLER CALIF.

For Every Weld Cleaning Need

NEW MODELS WITH STEEL HANDLES

TYPE E
Head, made of high-grade ¾ inch square tool steel, has a combination drift and chisel for general chipping purposes. Handle, of ⅜ inch round steel, has a special hand grip to absorb shock when chipping and to hook on welder's belt when not in use. Weight, 16 oz.

TYPE F
Similar to Type E, except that the head has two chisels at right angles. Weight, 16 oz.



TYPES EB and FB
Models E and F can be supplied with brush as shown here. Brush can be replaced by unscrewing countersunk screw in bracket and removing.

WELDER'S CHIPPING HAMMERS

Offer Advanced Features at Moderate Cost

WRITE DEPARTMENT 10W
For Descriptive Circular

MODELS WITH WOODEN HANDLES

TYPE A
DRIFT AND CHISEL
Made from high-grade tool steel. Especially popular in malleable iron and grey iron foundries for general chipping.

TYPE C
DRIFT AND CHISEL
Same as Type CB but without brush.

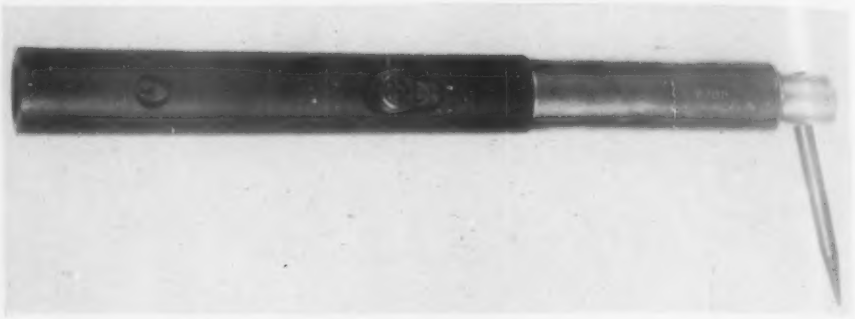
TYPE CB TRIPLE DUTY
Combines 3 tools in 1—drift, chisel, and removable wire brush.

CHICAGO MANUFACTURING & DISTRIBUTING CO.
1928 West 46th Street • Dept. W • Chicago 9, Illinois

Short Cuts and Kinks...

Easier Ways to Do Things

A few of the many time and labor-saving ideas developed by tacticians of the production line are presented every month in this department. If you have a good welding idea of your own to pass along, you are hereby invited to contribute it to this section. Send anything you think suitable to: Short Cuts and Kinks, THE WELDING ENGINEER, 506 S. Wabash Ave., Chicago 5.



Holder for carbon electrodes. It was designed to reach the "inaccessible" inner webs and spokes of aircraft landing-gear wheels.

Carbon-Electrode Holder

By Wilson L. Gibson

THE holder design I submitted in the Navy Employees' Suggestion Program, Naval Air Station, San Diego, was originated primarily to repair cracks or fill in "broken out" places in the ordinarily inaccessible inner webs and spokes of aluminum-alloy landing-gear wheels. This holder has also been found to be extremely useful in the repair of other cast aluminum-alloy aircraft parts.

The holder is for carbon-arc welding, which we consider far superior to the metal-arc process for the welding of these aluminum-alloy wheels. Carbon-arc welding can be accomplished without the usual sputtering of the metal arc, and a much smoother weld, practically free from flux inclusions, is possible. Greater heat can also be localized at the weld and greater penetration obtained. Finally, it is not necessary to preheat the part as must be done when using metal electrodes.

During a period of 3½ months, more than 50 landing-gear wheels have been salvaged at a low labor cost by use of this holder. A crack 1 in. long can be repaired in approximately 2 to 3 minutes. It is estimated that annual savings of $3,000 will result from adoption of my suggestion.

» «

Welding Quilting Studs

By Leslie Wolff

I SUBMITTED a suggestion under the Navy Employees' Suggestion Program to increase and improve the manufacture of quilting studs. These studs, which are used in large quantities in the installation of fiberglass insulation, are 1½ in. black iron discs having a ⅛ in. wire spot welded to one side at the center.

Prior to my suggested plan, studs were produced at Puget Sound Navy Yard by using three spot welders to weld the studs one at a time. The output of each spot welder was dependent upon the skill and dexterity of its operator. The studs were welded at the average rate of approximately 5,000 per machine per 8 hr shift.

I developed equipment to make better use of the production capacity of the spot welder. Functioning as part of the machine, a 24 station turret is indexed automatically under the welding tips by an air cylinder controlled by the welding mechanism. Each of the 24 stations contains a small collet chuck which will hold wire of any length up to 4 in. Two operators load the wires and discs in the station, and the two parts are welded together as they pass between the welding tips. A mechanical picker extracts the finished studs and drops them into a chute leading to a container at one side of the machine.

Spot welder attachment to weld glass insulation studs. The turntable is rotated by an air cylinder integrated with the spot-welder mechanism.

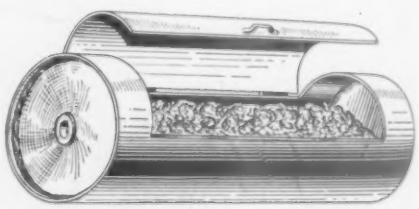
This equipment has increased the output of the machine to which it is attached by 400%, producing approximately 20,000 studs per 8 hr shift. Thus two spot welders and one operator are released for other duties, and an estimated annual saving of $15,000 is reported.

» «

A Good Annealing Bin

UNLESS a weld is properly cooled, it may crack to a greater extent than the original break; hence every welding shop, regardless of the size, should have a good annealing bin. It will not be too difficult for him to make one.

Annealing bins may be of various sizes, shapes and construction, depending upon the operator's personal preference or upon the materials he has to work with. In general, a sheet-metal bin is better than one of wood because (1) it will not catch fire if a hot casting becomes uncovered and touches it and (2) it is easy to construct with the welding torch by fashioning a box from sheet steel and attaching a hinged lid or cover. Many shops use an old cylindrical storage tank—even an old range boiler or old tank from a water heater—with a sec-



Courtesy, Linde Air Products Co.

An old storage tank makes a good annealing bin.

"Cleaner" FLAME CUTTING!

Gasweld

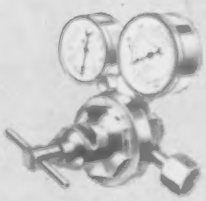
MACHINE CUTTING TORCHES

Above all other features—"Gasweld" Machine Cutting Torches are designed, and well known in the field for their "cleaner" cuts . . . so smooth and accurate that in many instances further machining is avoided. The "finger-tip" cam control of the high pressure oxygen valve, assures fast, low cost cutting without excess fluctuating of the preheating flame.

Models are available to operate on Liquefied Petroleum Fuel Gases, Propane, Philgas, Butane, etc.

Write today for illustrated bulletin and full information "Gasweld" Machine Cutting Torches and welding equipment.

Gasweld offers a full line of WELDING and Cutting Equipment and SUPPLIES.



Gasweld Pressure Regulators assure ample gas, even, constant pressure.

MC60 Gasweld 2 hose Machine Cutting Torch.

MC40 Gasweld 3 hose Machine Cutting Torch.

Weil Chemical Division

THE Liquid CARBONIC CORPORATION

3110 S. Kedzie Ave., Chicago 23, Illinois

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Canada:
Montreal, Quebec
Toronto, Ontario
Windsor, Ontario

tion cut out of the side and hinged back in place to serve as a lid.

There are several choices of insulation material for use in annealing bins, including shredded asbestos paper, dry asbestos cement, ordinary slacked lime and dry sand. Asbestos paper, of course, tears easily, especially after it has been used two or three times. The used paper should not be thrown away—if it is torn into bits and put into the annealing bin, it will soon become pulverized and afford an ideal material for burying hot, small castings.

Slaked lime, though not so efficient an insulator as asbestos, is often used in the annealing bin, for it is inexpensive, easy to handle and readily procurable. Sometimes clean, well-screened fine sand is also used for the same reasons. The sand should be perfectly dry since even slight dampness may cause a valuable welded part to crack.

After a small part has been welded, it should be placed in the bin, covered completely and left undisturbed until it is cold. In a shop where this procedure is regularly practiced, stresses due to expansion and contraction will never be much of a problem.

» «

UNCLE SAM STILL NEEDS YOUR MONEY —BUY VICTORY BONDS

Welding Fixture

By Emory F. Smith

My universal welding fixture was designed to hold tubing, flat or square stock or other small parts during tacking or welding operations. It is especially useful where parts are to be set at simple or compound angles with each other. A glance at the accompanying illustration will immediately reveal the great flexibility of this holder.

The base is made of Kirksite or cast iron and machined on the bottom surface; it is of sufficient weight to rest directly on the surface plate without using hold-down clamps. The clamp assembly is mounted in a discarded annular ball bearing secured in the base and is free to turn horizontally through 360 deg. The upper assembly is mounted on a discarded 2⅛ in. diam ball bearing and can be turned in any direction and locked by thumb screws. The clamp itself, a commercial spring clamp, can also be swiveled and locked in any position.

To use this fixture, we place one of the parts to be welded in a drill-press-type vise or V-block resting on a faceplate or other surface. The other part is placed in the clamp and set to the desired angle by means of an ordinary machinist's protractor. Pressure is maintained on the clamp jaws by means of a fairly strong spring incorporated in the tool.

The idea was submitted in the San Diego Air Station Navy Employees' Suggestion Program. Adoption of this suggestion has converted a slow, clumsy hand operation into a speedy, efficient mechanical operation. As a result, the welding of tubes and small parts—especially where compound angles are involved—has been greatly expedited. The tool is of simple construction and is very versatile.

A universal welding clamp which turns at any angle vertically and horizontally.

No Perceptible Lag . . . or Surge

for Your Engine-Driven Arc-Welders

● Sensitive, responsive Pierce Flyball Governors compensate for load variations in engine-driven arc-welders—so promptly that there is no perceptible lag between striking of the arc and full recovery of current characteristics.

Pierce Governors have proved themselves as standard equipment on the finest engine-driven welders —because their dependable *centrifugal* action assures accuracy, complete dependability and long life. Without readjustment or service, they often outlast the engines they control. They never gum, or stick. or interfere with carburetion.

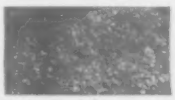
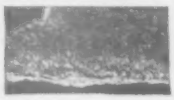
Specify Pierce Governors when you buy new engine-driven welding equipment—and write for full information if your present units are not Pierce-governed.

THE PIERCE GOVERNOR COMPANY, INC.
1607 OHIO AVENUE • ANDERSON, INDIANA

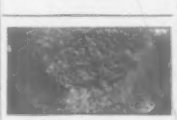
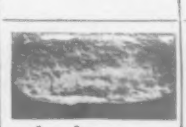
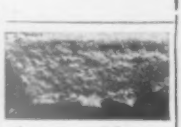
Manufacturers of
Pierce Precision Governors and Sisson Automatic Chokes

PIERCE GOVERNORS

Metal Identification by Fracture or Chip

	WHITE CAST IRON°	GRAY CAST IRON	MALLEABLE* IRON	WROUGHT IRON	LOW-CARBON STEEL AND CAST STEEL	HIGH-CARBON STEEL
FRACTURE	Very fine silvery white silky crystalline formation	 dark gray	 dark gray	bright gray	bright gray	very light gray
UNFINISHED SURFACE	Evidence of sand mold; dull gray	Evidence of sand mold; very dull gray	Evidence of sand mold; dull gray	Light gray; smooth	Dark gray; forging marks may be noticeable; cast—evidences of mold	Dark gray; rolling or forging lines may be noticeable
NEWLY MACHINED	Rarely machined	Fairly smooth; light gray	Smooth surface; light gray	Very smooth surface; light gray	Very smooth; bright gray	Very smooth; bright gray

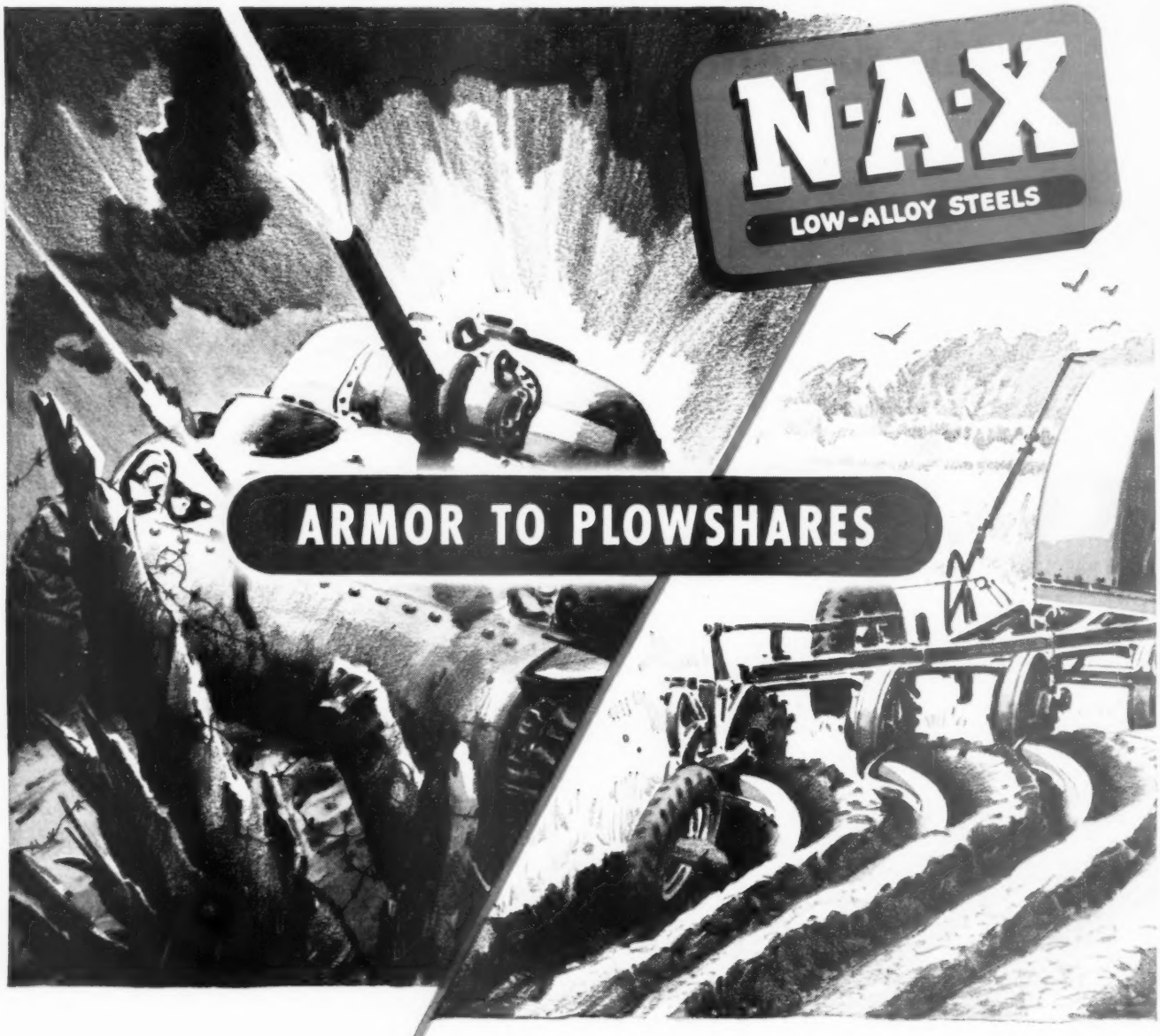
	WHITE CAST IRON°	GRAY CAST IRON	MALLEABLE* IRON	WROUGHT IRON	LOW-CARBON STEEL AND CAST STEEL	HIGH-CARBON STEEL
APPEARANCE OF CHIP	Small broken fragments	Small partially broken chips but possible to chip a fairly smooth groove	Chips do not break short as in cast iron	Smooth edges where cut	Smooth edges where cut	Fine grain fracture; edges lighter in color than low-carbon steel
SIZE OF CHIP		1/8 in.	1/4–3/8 in.	Can be continuous if desired	Can be continuous if desired	Can be continuous if desired
FACILITY OF CHIPPING	Brittleness prevents chipping a path with smooth sides	Not easy to chip because chips break off from base metal	Very tough, therefore harder to chip than cast iron	Soft and easily cut or chipped	Easily cut or chipped	Metal is usually very hard, but can be chipped

	ALLOY** STEEL	COPPER	BRASS AND BRONZE	ALUMINUM AND ALLOYS†	MONEL METAL	NICKEL	LEAD††
FRACTURE	 medium gray	 red color	red to yellow	white	light gray	 almost white	white; crystalline
UNFINISHED SURFACE	Dark gray; relatively rough; rolling or forging lines may be noticeable	Various degrees of reddish brown to green due to oxides; smooth	Various shades of green, brown, or yellow due to oxides; smooth	Evidences of mold or rolls; very light gray	Smooth; dark gray	Smooth; dark gray	Smooth; velvety; white to gray
NEWLY MACHINED	Very smooth; bright gray	Bright copper red color dulls with time	Red through to whitish yellow; very smooth	Smooth; very white	Very smooth; light gray	Very smooth; white	Very smooth; white

	ALLOY** STEEL	COPPER	BRASS AND BRONZE	ALUMINUM AND ALLOYS†	MONEL METAL	NICKEL	LEAD††
APPEARANCE OF CHIP	**	Smooth chips; saw edges where cut	Smooth chips; saw edges where cut	Smooth chips; saw edges where cut	Smooth edges	Smooth edges	Any shaped chip can be secured because of softness
SIZE OF CHIP	**	Can be continuous if desired	Can be continuous if desired	Can be continuous if desired	Can be continuous if desired	Can be continuous if desired	Can be continuous if desired
FACILITY OF CHIPPING	**	Very easily cut	Easily cut; more brittle than copper	Very easily cut	Chips easily	Chips easily	Chips so easily it can be cut with penknife

*Very seldom used commercially.
°Malleable iron should always be brazed or bronzewelded.
**Alloy steels vary so much in composition and consequently in results of test that experience is the best solution to identification problems.
†Due to white or light color and extreme light weight, aluminum is easily distinguished from all other metals; aluminum alloys are usually harder and slightly darker in color than pure aluminum.
††Weight, softness and great ductility are distinguishing characteristics of lead.

Courtesy, The Linde Air Products Co.



It has already happened. . . . One of the fine-grained N-A-X low-alloy steels — steels that have provided armor for tanks and landing craft, frames for all jeeps, and vital parts for scores of fighting vehicles — has been "beaten into plowshares" to produce priority equipment for agriculture.

The particular steel was N-A-X 9120, a carburizing grade. Its ready response to carburization and heat-treatment is utilized to produce a farm implement that is "tough to the core" and that has the required surface hardness to resist abrasion and wear.

The conversion of an N-A-X low-alloy steel from tools of war to tools of peace is not surprising . . . just prophetic. For the same wide range of desirable properties that made these fine-grained steels a great military material recommends their use in civilian products.

GREAT STEELS FROM GREAT LAKES

GREAT LAKES STEEL
Corporation

N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN

UNIT OF NATIONAL STEEL CORPORATION

Welding the smokestack for the Stalin heavy machinery works in Kramatorsk, Russia. The big cylinder is 65 meters (213 ft) long and weighs 56 tons. It was made from local materials.

Welding in Soviet Reconstruction

WELDING is playing an important part in the restoration of the Nazi-wrecked heavy industries of Soviet Russia. The accompanying picture shows workers welding the smokestack for the Stalin heavy machinery works in Kramatorsk. Materials salvaged from the wreckage were used to build this big steel cylinder.

Another example of Soviet reconstruction is provided at Mariupol, southern Ukraine, where the retreating Nazis dynamited four blast furnaces of the Azovstal iron and steel works. Two were blown up beyond repair, and the others were so badly damaged that it required months of hard labor merely to clear away the debris. Nevertheless, one blast furnace has already been rebuilt and another will shortly be in operation.

Restoration of the damage was started immediately after the liberation of Mariupol. Metallurgists first restored a small cupola to provide themselves with iron castings; then several machine tools were put together from parts salvaged from the wreckage. Parts of the blasted equipment which could be repaired were used in the rebuilding of cranes, open-hearth furnaces and power units. Welding and flame-cutting, of course, helped to make such salvage possible.

Prior to the German invasion, the Azovstal works had an annual output of up to 2,000,000 tons.

Aids to Aluminum Spot Welding

(Continued from page 481)

fing to clean the exterior surfaces, but it is not to be used on faying surfaces after buffing.

Constant attempts were made to have more and more of the work qualified without the buffing operation, and considerable success was achieved on some particular types of assemblies.

Jigs and Fixtures

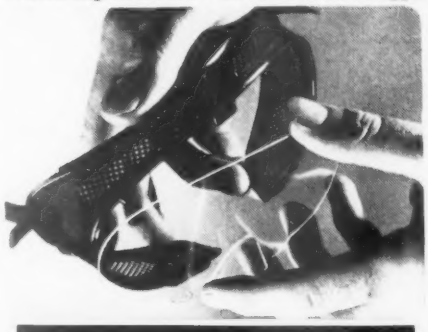
The coördination of tooling with resistance welding was found to be very important at Boeing. Efforts were continually being made to develop new and improved jigs, fixtures and handling equipment. Factors taken into consideration were: resultant quality of work; safety; speed and ease of operation; durability with respect to weight, quantity and cost. It has been definitely established that the cost for such spot-welding equipment to obtain the correct contour and shape is less than that for other types of joining operations on major and minor assemblies.

Resistance welding at Boeing has matched advancements in plane development stride for stride. In one instance, it was necessary to spot weld approximately 2,800 steel nut plates daily to meet the production schedule. The job called for four operations: fastening the nut plates to various types of cowling and stiffeners with screws, setting with screws, welding and removal of screws.

To increase the efficiency, electrodes were made with a special bottom having a spring tension pin upon which the production part was placed. The nut plate was then inserted, welded and removed from the pin. Because the nut plates were threaded, the pin was made approximately 0.015 in. smaller with a small shoulder to protect the threads from damage. The fixture was highly satisfactory.

Time-saving developments like those mentioned were highly important in turning out the great aircraft armada that helped so mightily to bring us final victory.

Outstanding Features of the Willson MonoGoggle



SHATTERPROOF

Workers get overall eye and nose safety with the all-plastic MonoGoggle. One piece lens rigidly anchored but easy to replace. On test resisted steel ball traveling 225 ft. per sec. For grinding, chipping, spot welding and similar eye hazards.

COMFORTABLE

In addition to safety, MonoGoggle wearers get all-day comfort . . . assured by the extremely light weight, rolled contact edges and adjustable head-band. And for protection from glare, the MonoGoggle is now available with the new Tru-Hue Green lens.

OVER GLA[illegible]ES

The economical MonoGogg[illegible]les the worker to wear his own prescription glasses and saves management and worker the cost of a special pair.

The cost of MonoGoggles is low too—ask your Willson Distributor or write direct to Dept. WE-4.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

DOUBLE WILLSON

PRODUCTS INCORPORATED

READING, PA., U.S.A. Established 1870

★ OPERATION

Positioned Welding with Crane

By T. B. JEFFERSON

Bilge box sections for the hulls of LST ships were too bulky to be handled by positioners. Turning them with a crane was ticklish work—till Bill Saunders had an idea.

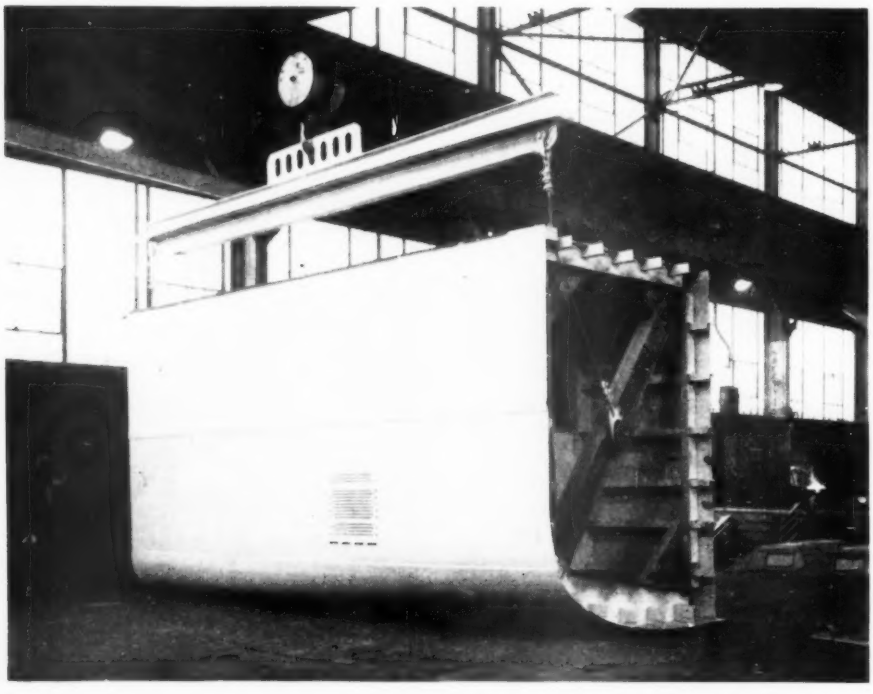


Fig. 1—Bilge box ready to be turned by overhead crane. An equalizer bar is attached to the hook of the crane, and cables run from this to trunnions at each end of the 16½ ton structural section.

THE building of jigs, fixtures and other ingenious "gadgets" has played a most important part in speeding up wartime construction. The fabricating division of the American Rolling Mill Co., Middletown, O., provides an excellent example of the manner in which such gadgets come into being.

Big Boxes Bulky

Armco was confronted with a serious handling problem in the prefabrication of bilge box sections for LST boats. These bilge boxes form part of the hull of an LST. Each weighs 16½ tons and measures 24 ft long by 12 ft high by 10 ft wide—too bulky to handle on a positioner. It was decided from the standpoint of economical production, however, that these boxes must be positioned for downhand welding. Since they could not be handled on a positioner, the only feasible means of rolling them over was to enlist the aid of a traveling crane.

Yes, the bilge sections *could* be turned with the crane, but it was a nerve-racking, crane-wrecking job. The weight of the section tended to pull the crane along its tracks, whipping the cables and nearly tearing the crane from the building. There were many safety hazards until Bill Saunders, a crane leaderman on one of the shifts, originated a plan to overcome the difficulty.

Solution: An Equalizer Bar

Briefly, the Saunders plan was to attach an equalizer bar on the crane (see Fig. 1). A cable guide and a trunnion were then fastened to each end of the bilge box. When the crane lifted a box, it would gently make a quarter turn and roll to place the seams in proper position for further downhand welding (Fig. 2). The comparatively simple device not only provided a much easier method of building these bilge boxes but at the same time made its originator somewhat richer. Bill Saunders won a well deserved prize for contributing this production speed-up idea.

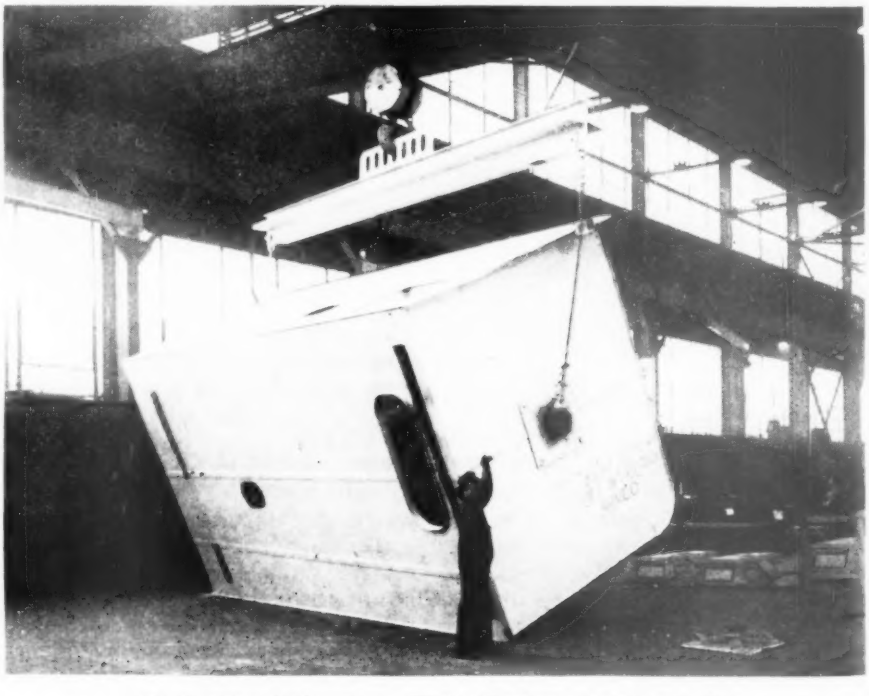


Fig. 2—It is a simple matter to lift the bilge box and roll it a quarter turn for further downhand welding. Note the cable guides.

New Products to Use

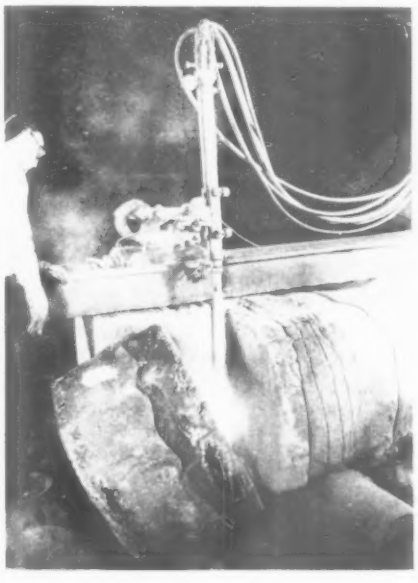
Coating Sticks

★ When cable and wire rope are butt welded, damage to the metal coating results. A product recently improved by the **American Solder & Flux Co.**, 2152 E. Norris St., Philadelphia 25, is said to do a most economical job in replacing the damaged metal coating. All that is necessary is to apply the "Amco" coating stick to the heated wire. Four types of coatings are available: "A" a pure tin coating, "B" a tin and lead combination, "C" a lead coating and "E" a zinc coating.

Manufacturer claims that the coatings produced by the Amco sticks are the equivalent of the hot dip process and that the "E" galvanizing stick will protect the metal surface in a manner equivalent to hot galvanized coatings.

Machine Cutting Torch

★ A heavy-duty, water-cooled cutting torch, the "Oxweld C-45," and a holder for machine mounting have been introduced to facilitate the flame-cutting of steel ranging in thickness from 10 to 50 in. In shops where steel over 18 in. thick must be cut frequently, the C-45



Cutting a chrome-nickel-molybdenum hot top to charging box size with the new "Oxweld C-45" machine cutting torch. The cut through a 29 in. section is made at a rate of 3 in. per minute.

provides a tool for making these cuts quickly and economically. It is particularly suited for hot top cutting, ingot slitting, riser cutting, cutting large forgings and for many applications of scrapping for which the oxygen lance is ordinarily required.

Intended to be mounted on a heavy-duty straight-line cutting machine, the C-45 is designed to operate at low cutting-oxygen pressures—never over 35 psi—and with medium-pressure acetylene. Unless cutting oxygen is supplied from a pipe line, at least 10 oxygen cylinders should be manifolded to provide sufficient capacity. An acetylene generator or a manifold having a minimum hourly capacity of 500 cu ft will be satisfactory.

The Oxweld C-45 holder, designed especially for this torch, provides for easy, accurate and stable vertical and angular adjustments. The vertical adjustment is obtained by turning a ball crank operating a worm and gear that mesh with the torch rack. A total angular adjustment of 135 deg can be obtained in the plane of the cut. **The Linde Air Products Co.**, 30 E. 42nd St., New York City 17.

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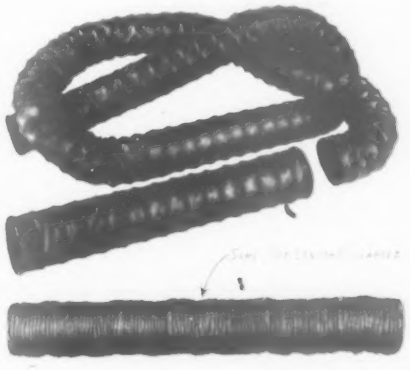


"Portovent," a lightweight, large-diameter hose that is well suited to welding fume exhausters. Note how it "collapses" for transportation.

Ventilating Hose

★ "Portovent" is the trade name of a metal-reinforced ventilating hose developed to meet needs for lightweight, large-diameter ducts which can be compressed into small space for transportation and yet stay open around sharp bends. It is particularly well suited for use with portable manhole and tank ventilators, welding fume exhausters, etc. The sectional construction allows the assembly of any desired length of duct from 2½ ft sections, which may be readily coupled and uncoupled without tools. The sections form a tight joint which will not be broken by the jerks or pulls encountered in service, manufacturer states. Special attachments are provided for coupling to blowers or other air-handling apparatus, and these fittings couple interchangeably with either end of any section.

The reinforcement rings, spaced from 2 to 5 in. apart according to the hose diameter, are held firmly in place by a Neoprene-base compound, which also covers the entire inside and outside surfaces of the hose.

"Portovent" is offered in diameters of from 5 to 24 in. Compression for packing is 6 to 1 overall and can be still greater if the application is for light service. **American Ventilating Hose Co.**, 15 Park Row, New York City 7.

Underwater cutting equipment for arc-oxygen cutting.

Underwater Cutting Equipment

★ The arc-oxygen process of cutting metals under water was perfected during the war until 1 in. steel plates can be cut at the rate of approximately one foot per minute. With the postwar availability of steel tubular electrodes, the process is now open to all interested in ship salvage and other underwater uses. The complete equipment necessary to use the arc-oxygen method of cutting metals under water is being offered by the **Chicago Tool and Engineering Co.**, 8383 South Chicago Ave., Chicago 17.

Mild-Steel Electrode

★ The new Hollup "Sureweld CX" is a mild-steel, shielded-arc electrode in the AWS E-6013 class, especially developed for the production of quality welds in all positions—flat, vertical, horizontal and overhead—with either a-c or d-c welders. It is particularly adaptable to light-gauge metal because of its smooth arc, speedy deposit, mild penetration and minimum spatter, manufacturer states. It is also adaptable to poor fit-ups and to heavy plates. Excellent performance may be achieved in either single- or multiple-pass welds. The bead has a fine ripple and a flat to slightly convex profile. Slag is easily removed—in many instances the weld is almost self cleaning. **Hollup Corp.**, division of National Cylinder Gas Co., 4700 West 19th St., Chicago.

Willson "FeatherSpec" shield. The nose rest is part of the lens, which is suspended in a grooved metal frame.

Lightweight Eye Shield

★ Willson Products has developed a plastic eye shield weighing less than an ounce for use in semihazardous jobs such as spot welding and light grinding. The new "FeatherSpec" is featured by a one-piece plastic lens that is interchangeable or replacable in ten seconds. The lens, gripped tightly in a suspension-lock metal frame, is released from the grooved frame with a slight pull. This makes it easy to substitute a green lens for a clear lens if the work involves glare or to go from green to clear when more light is needed.

The shield can be worn over prescription lenses with entire comfort. Only one size is needed to fit any face because the nose rest is part of the lens, simplifying the job of obtaining a proper fit. **Willson Products, Inc.**, Reading, Pa.

» «

High-Tensile Electrode

★ Lincoln "Fleetweld 11-HT" is a shielded-arc electrode for grooved butt joints and horizontal or flat fillets in high-tensile steels such as ASTM A-212. It conforms to AWS specifications E-7020 and/or E-7030 and is available in 3/16 and ¼ in. diameters. This electrode may be used with either alternating current or direct current, straight polarity.

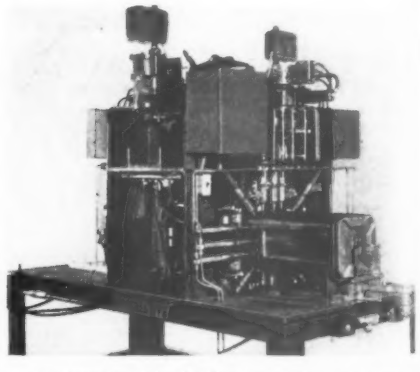
All-weld-metal test specimens of "Fleetweld 11-HT" deposits show tensile strengths of 75,000-80,000 psi, yield strengths of 59,000-62,000 psi and elongation in 2 in. of 19-23% as welded. Stress relieving at 1,200 F lowered tensile strengths and yield strengths (72,000-76,000 psi and 57,000-61,000 psi, respectively) but raised ductility (elongation in 2 in.) to 25-30%.

Butt welds made with this electrode are exceptionally good and free from porosity, manufacturer claims. Fillet welds are smooth with a flat face. Other advantages are a low spatter loss, steady arc and freedom from undercutting. **The Lincoln Electric Co.**, Cleveland 1.

» «

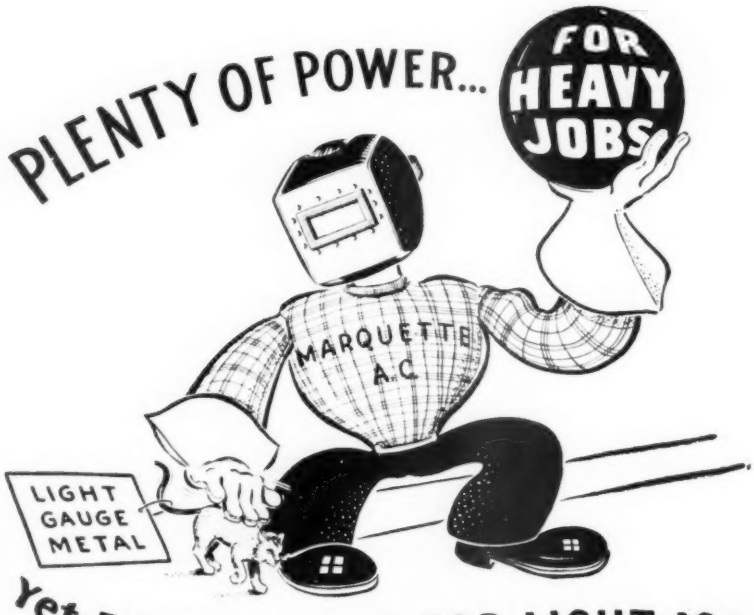
Multiple Spot Welder

★ Typical of the wartime developments which are going to reduce peacetime production costs is the "dual hydromatic" multiple spot welder pictured in the accompanying illustration. It was built for the assembly of ammunition boxes and is termed "dual" because there is a duplicate welding station in the back of the vertical panel. The interlocking controls are so arranged that one operator welds while the other one is loading. A single transformer serves for both welding stations, and simple air shuttling fixtures reduce loading time. **Progressive Welder Co.** 3050 E. Outer Drive, Detroit 12.



A storage and shipping unit for 40 mm ammunition being fabricated with a Progressive "dual hydromatic" spot welder.

PLENTY OF POWER... FOR HEAVY JOBS



Yet EXTRA GENTLE FOR LIGHT JOBS

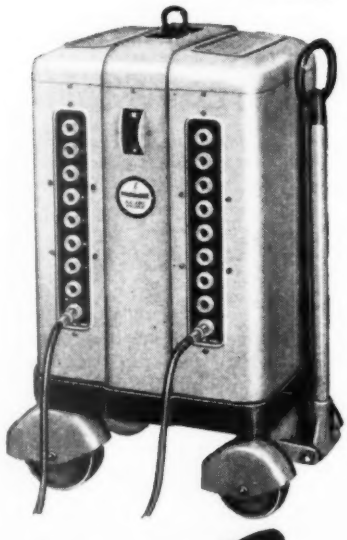
Marquette A.C. Arc Welder's wide range of accurately controlled, matchless welding power supplies Plenty of Power for quickly welding heavy steel structures . . . and Perfect Arc Control for welding light gauge metal. This wide range gives you complete coverage of all welding jobs.

The complete absence of troublesome "Magnetic Blow" saves time and tempers when working on difficult jobs in close quarters. The exclusive A.C. feature of "Balanced Polarity" gives Thorough Penetration and Metal Control with a single rod.

All these features make Marquette the ideal welder for quick, good looking, dependable and profitable welding in your shop. 700 Marquette Distributors are ready to serve you.

Send for Free 24 page illustrated booklet

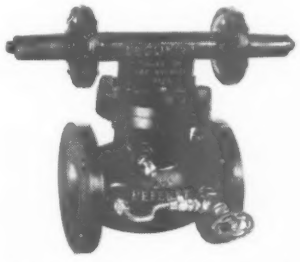
MARQUETTE MFG. CO., INC.
Minneapolis 14, Minnesota



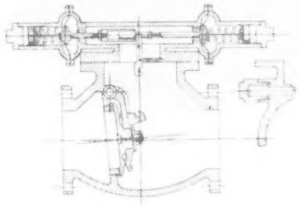
MARQUETTE
REGISTERED U.S. PAT. OFFICE
Welding EQUIPMENT
ELECTRODES And SUPPLIES

Automatic Shut-off Valves

★ "Defense" automatic shut-off valves for gases, oils and other liquids are designed for installation in industrial plants as a protective measure against the damage and losses that occur when lines are ruptured, flashbacks take place or pressures become unsafe. The valve automatically closes a gas or oil line in the event of its rupture by explosion etc. or when the pipe-line pressure rises above or falls below safe predetermined maximum and minimum operating pressures. However, it is not subject to premature closing because of vibrations.



"Defense" automatic shut-off valve for gas and oil pipe lines. Sketch gives the method of operation.



Valves placed in reverse to each other, on either side of a danger area, will save both flow and line pack in the case of a rupture. When operating pressures rise above or fall below the closing pressures set on the diaphragm springs, the diaphragm shafts move the disc lever, tripping a latch. This releases the valve disc and allows the valve to close. To reset, the screwed cap cover on the stuffing box is removed and the valve disc lever rotated until the dog on the lower end of the tripping latch engages the dog on the valve disc.

These valves are available in eight sizes, from 1¼ to 8 in. The 1¼ and 1½ in. sizes are screw type; those 2 in. and over are flanged. **Security Valve Co.**, 410 San Fernando Road, P. O. Box 1551, Los Angeles 53.

Inconel Electrode

★ A new electrode suitable for both a-c and d-c welding of wrought Inconel, cast Inconel and the Inconel side of Inconel-clad steel is now in production at the Bayonne Works of International Nickel. This electrode may be used on either straight or reversed polarity. It is said to be characterized by improved arcing qualities, simplicity of slag removal and the ability to make crack-free welds in any thickness. Available sizes are 0.075, 3/32, 1/8, 5/32 and 3/16 in. **The International Nickel Co., Inc.**, 67 Wall St., New York City 5.

SPEED RECONVERSION

WITH COMPOSITE DIE FABRICATION BY WELDING

(Above) Composite-Fabricated Die. The Base is Mild Steel, the Cutting Edges, "Hard-As-Welded" Deposits of Eureka Oil-Hardening Tool Steel Electrodes.

Eureka Tool and Die Welding Electrodes, for composite die fabrication, facilitate planning and effect speedy results in reconversion. Plain carbon or low alloy NE steels are used as a base and weld deposits of the various Eureka Tool and Die Welding Electrodes constitute the cutting edges or working areas. Units so constructed efficiently replace those constructed entirely of tool steel.

ELIMINATION OF HEAT TREATMENT

Deposits of Eureka Electrodes, which are "hard-as-welded" eliminate the need of complete heat-treatment after welding.

COSTLY MAINTENANCE AVOIDED

The ability to produce a composite tool or die results in a working surface of any desired characteristic with a resilient core.

CONVERTING INTO COMPOSITE UNITS

Convert existing tool steel die sections into composite units to meet unusual conditions.

MACHINING IS FINAL OPERATION

In composite fabrication by welding, finish machining, drilling, etc., can be done as final operations.

INSERTS ELIMINATED

Composite fabrication by welding eliminates the use of inserts, which are often too costly, unsatisfactory or impractical.

MULTIPLE APPLICATIONS

In composite fabrication by welding, it is practical to weld two, three or four types of unlike materials on one die unit to perform individual functions.

EUREKA STEEL ELECTRODES — YOU FIND THE JOB

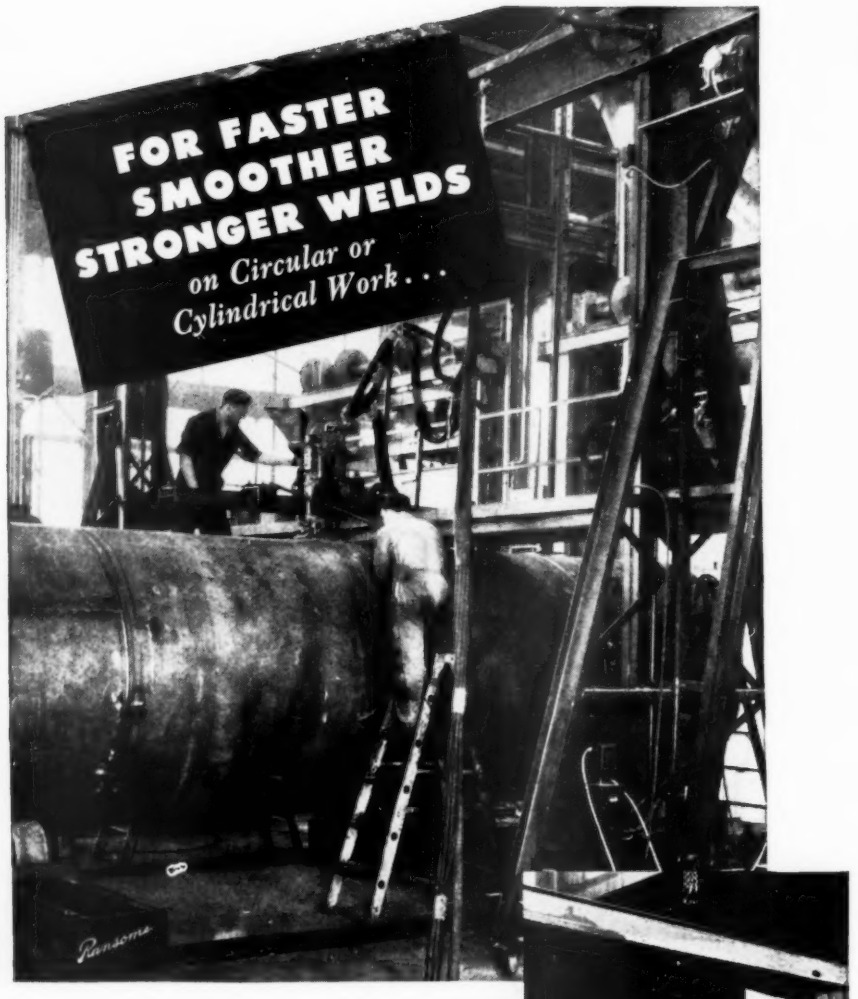
Welding Equipment & Supply Co.

PIONEERS IN TOOL AND DIE WELDING ELECTRODES

223 LEIB STREET • FITZROY 3715 • DETROIT 7, MICHIGAN

WRITE FOR YOUR COPY TODAY

This manual will help you save man-hours, conserve material and minimize production delays by outlining methods of repairing and compositely fabricating tools and dies, as well as correcting design and rectifying errors. Send for your copy today. It is fully illustrated with typical welding applications.



Weld It Automatically on Ransome Positioners or Turning Rolls

Whatever the weight or diameter of your circular or cylindrical work up to 75 tons and 14 ft., there's a Ransome Positioner or Turning Roll Unit for rotating it at the right speed that will give you all the time-material-labor-saving benefits of automatic welding. Stronger, smoother welds... as much as 50% faster production. Investigate Ransome Positioners and Turning Rolls—today. Bulletin 210 gives all the facts.

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Power Plant Equipment • Turbines & Turbo-Generator Sets • Diesel & Gas Engines • Pumps & Compressors • Air Conditioning & Refrigerating Equipment • Construction & Mining Machinery • Power Transmission Equipment • Locomotive Feedwater Heaters • Welding Positioning Equipment • Liquid Meters

24R5-18

RANSOME

Industrial Division
Ransome
MACHINERY COMPANY
Dunellen, New Jersey

Booths for Metallizing

★ Ordinary spray booths designed for paint and similar materials are not satisfactory for metallizing because of the strong blasts of air and metal from the metallizing gun. This difficulty has been overcome with a complete line of spray booths and dust-collecting equipment designed, engineered and built expressly to handle sprayed metal dust. The line includes spray booths which exhaust into present exhaust systems, to the atmosphere or into a wet collector. The wet collectors and water-wash spray booths gather metal particles in a sludge sump, where the valuable dust may be reclaimed. There is also a lathe exhaust unit which is mounted directly on the lathe carriage and moves with it. **Metallizing Engineering Co.**, Long Island City 1, New York.

Metco spray booths offer such advantages as a sloping rear wall that eliminates eddies and recirculation, open-type work table, down draft, dust trap and cleanout door.

Ampco-Clad Sheet

★ The need of industry for plate or sheet surfaced with "Ampco Metal" (aluminum bronze) has been met with "Ampco-clad," an Ampco-steel bonded sheet and plate product suitable to protect parts and assemblies subject to the attack of rust and corrosion. Suggested uses include: hot water tanks water softeners, ship hulls, acid-resistant tanks, oil well equipment, chemical processing tanks, tank cars and other similar applications. Thicknesses range from 0.30 to 3½ in.

The actual bonding is done under heat and pressure in an atmosphere-controlled furnace. The process makes it possible to clad a steel billet with Ampco metal and then roll it to the required gauge. The material can be clad on either one or two sides as desired, and the percentage of cladding material may be varied from 10 to 40%. The clad material in semi-annealed condition can be worked with the same ease as standard Ampco Metal sheet and plate stock. **Ampco Metal, Inc.**, 1745 S. Thirty-eighth St., Milwaukee 4.

SIL-FOS and EASY-FLO

READY TO START ON NEW PRODUCTION

NOW!

Back from the production battlefront Sil-Fos and Easy-Flo are ready to help you with new metal joining ideas. They are ready to show how production rates can be boosted—and how costs can be greatly reduced.

Ways of getting maximum benefits from these two versatile alloys have been crystallized during the last few years into definite brazing procedures. The full value of alloy preplacement has been brought out—fast heating and handling have made it possible to take full advantage of SIL-FOS and EASY-FLO'S low brazing temperatures and fast brazing action.

No matter what your problem is—making a few joints by torch or a hundred thousand by an automatic heating method—joining ferrous, non-ferrous or dissimilar metals—using brazed construction in place of casting, forging, machining from solid, riveting, bolting or threading—it will pay to find out how SIL-FOS and EASY-FLO can help you make better joints at lower cost. Deliveries are again approximately back to normal. .

BULLETIN 12-A GIVES FULL DETAILS

It tells what they are and how to use them to best advantage. If you have a metal joining problem send us samples—we'll gladly give our recommendations. Write us if you'd like an engineer to call.

ARMY NAVY

HANDY & HARMAN

HANDY & HARMAN FOUNDED 1867 QUALITY SERVICE

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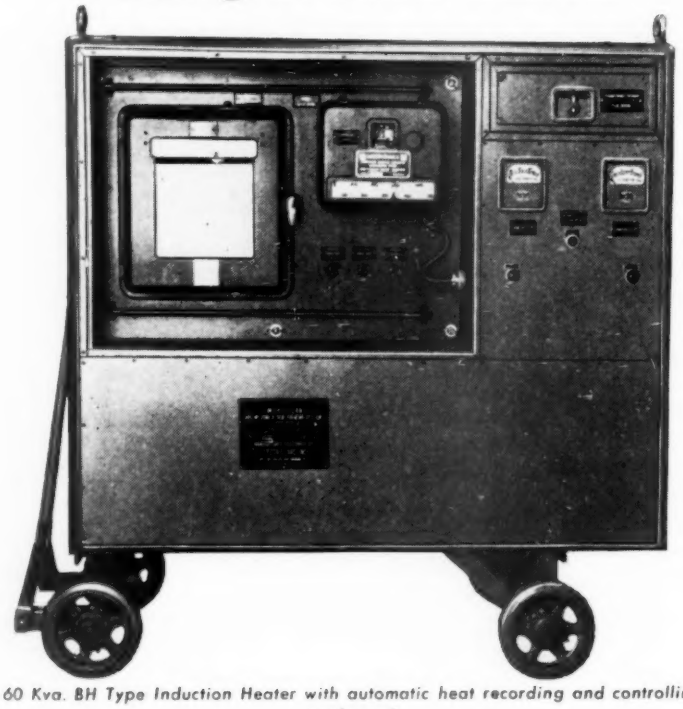
FOR BEST RESULTS—USE HANDY FLUX

To get full benefit of the low flow points of SIL-FOS (1300°F.) and EASY-FLO (1175°F.) you need a flux that also functions at a low temperature. HANDY FLUX starts to fuse and dissolve oxides at 800°F., and at 1100°F., is entirely fluid, and dissolves all refractory oxides rapidly and completely.

HEAT TREATING

"The LINK That Joins Your Welding to Good Results"



60 Kva. BH Type Induction Heater with automatic heat recording and controlling equipment

Preheating may be the one missing link in your chain of welding operation that causes you to miss out. Don't neglect this important link to good results.

Your welding job is no better than the heat treatment it receives, both before and after welding.

If you select Low Frequency Induction pre- and post-heating equipment, you assure dependable results and absolute control in this important link.

The Smith-Dolan System provides maximum convenience and efficiency in Induction Heating. It is now meeting successfully the long felt need for a combination shop and field heating unit to bring dependability to the welding of alloy and high carbon steels.

Whether the welding job involves:

High pressure steam lines . . .

or

The propeller shaft of a fighting ship . . .

or

Pre- and post-heating of boiler drums and plates when automatic arc welding is used . . .

. . . or any other important job . . .

THE RESULTS JUSTIFY THE SELECTION OF THIS METHOD

Wherever controlled deep heating penetration is necessary, the Smith-Dolan System is the choice.

Our experience is at your service. Let us show you how pre-heating and normalizing can do a better welding job for you.

ELECTRIC ARC INC.

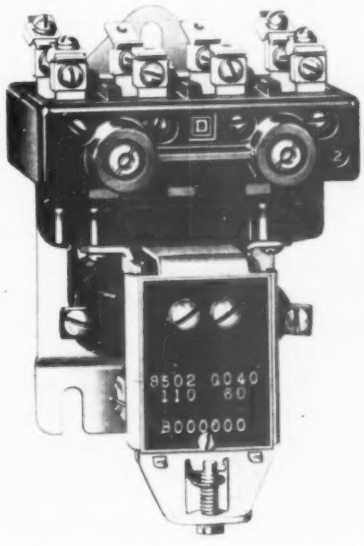
152-162 Jeliff Ave. Newark 8, New Jersey

Also manufacturers of

Arc Welders—Gasoline and Deisel Driven—Power Units—A. C. Welders

Size OO Contactor

★ Convertible contacts, easily changed from normally open to normally closed without additional parts, are a feature of



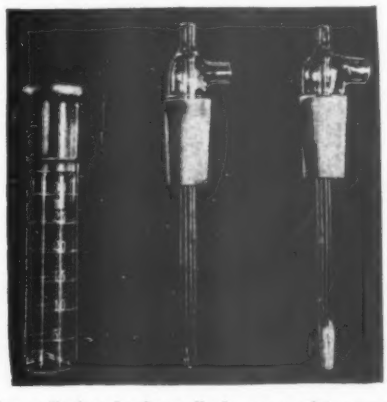
Square D "Type Q" contactors combine both accessibility and compactness.

the new size OO, "Type Q" contacts just announced by Square D. Conversion from normally open to normally closed is performed simply by removing a movable contact assembly, inverting it and putting it back in place. Other features are a new-type contact bar and guide and double-break silver contacts. Suitable for mounting on steel panels, these contactors are rated at 600 volts, a-c (maximum), 10 amp open and 9 amp closed. **Square D Co.**, 4041 N. Richards St., Milwaukee 12.

» «

M. S. A. Midget Impinger

★ All-glass sampling units for use with the M. S. A. "Midget Impinger" have been developed. The impinger, widely known in dust sampling, is a small, compact instrument for surveying dust hazards. The new sampling units consist of a flask and nozzle with a standard taper ground-glass stopper. A fritted glass bubbler is also available. **Mine Safety Appliances Co.**, Braddock, Thomas and Meade Sts., Pittsburgh 8.



These all-glass impinger flasks are used to sampl dusts and a wide variety of gases and vapor

We believe this new 5x163 AO WELDING GLOVE is the best Welding Glove ever developed

...and here's why

MATERIAL: This newly designed glove is made of carefully selected chrome tanned split horsehide leather... long wearing, heat resisting and extremely flexible.

DESIGN: The new glove has a one-piece back and palm. It is expertly designed to provide maximum comfort. The back lining is double the weight of that used in conventional type welding gloves, giving much greater protection against heat.

SEAMS: All seams and vulnerable spots on finger tips are welted for extra protection. Welting tightens the seams, preventing heat and sparks from burning through.

Contact your nearest AO Branch Office for complete information.

American Optical

COMPANY

SOUTHBRIDGE, MASSACHUSETTS

Small Welding Torch

★ Weldit, Inc., announces a lightweight (7 oz) torch for welding which is said to

Weldit Model UN-45, a lightweight welding torch for delicate tasks.

be especially adapted to silver brazing, jeweler's work, aluminum welding, lead burning, aircraft production, etc. Employable tips are from 0 to 6 inclusive. The torch has an overall length of 8½ in. and is made of brass, with the base casting of brass and copper. It may be used with acetylene or with another fuel gas such as natural or manufactured gas, butane or other low-temperature gases. **Weldit, Inc.**, 628 Bagley Ave., Detroit 26.

Metal-Washing Unit

★ The Optimus "single-stage" washer is a portable unit that both rinses and washes metal parts. It can be "spotted" where the work is and readily shifted from department to department throughout the plant. The unit is small and

Optimus popular-size metal wash and rinse unit.

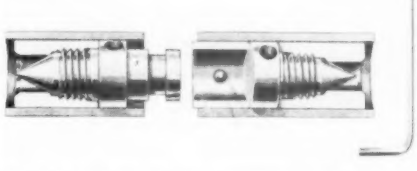
compact, occupying a floor area of only 12 sq ft. It is equipped with moving jets and vertical sliding doors that control the splash and spray. Any type of heating device and thermostatic control can be installed. **Optimus Equipment Co.**, 249 Church St., Matawan, N. J.

Aluminum Cleaning Solution

★ "Optimus" aluminum precleaner and deoxidizers are announced for the production of low surface resistance on aluminum sheets prior to spot welding. Advantages claimed are: a smut-free surface, oxide removed with a cold solution, negligible weight loss, minimum machine adjustment and handling, complete removal of shop dirt, cutting oil, grease and identification paint in the precleaning operation. **Optimus Detergents Co.**, 248 Church St., Matawan, N. J.

Cable Connector

★ The Garibay "Speed Cable" connector is fully mechanical in its operation, and a secure cable connection can be



Garibay "Speed Cable" connector. A quick mechanical connection is made without soldering.

quickly obtained without the use of molten lead or solder. All that is necessary is to flare the end of the cable, insert it into the end of the connector and screw the latter tight. The opposite end of the connector is then inserted and given a quarter turn to complete the connection. **Yarco Distributors**, 215 West 7th St., Los Angeles 14, and 120 Wall St., New York City 5.

DOCKSON WELDING HELMETS

A complete line of Welding and Safety equipment

Equipped with No. 4 headgear—quickly and easily adjusted.

Molded, one piece shell.

Deep shell affords extra protection.

Leak proof lense holder.

Adjustable pivot assembly.

Light, sturdy, shock-proof construction.

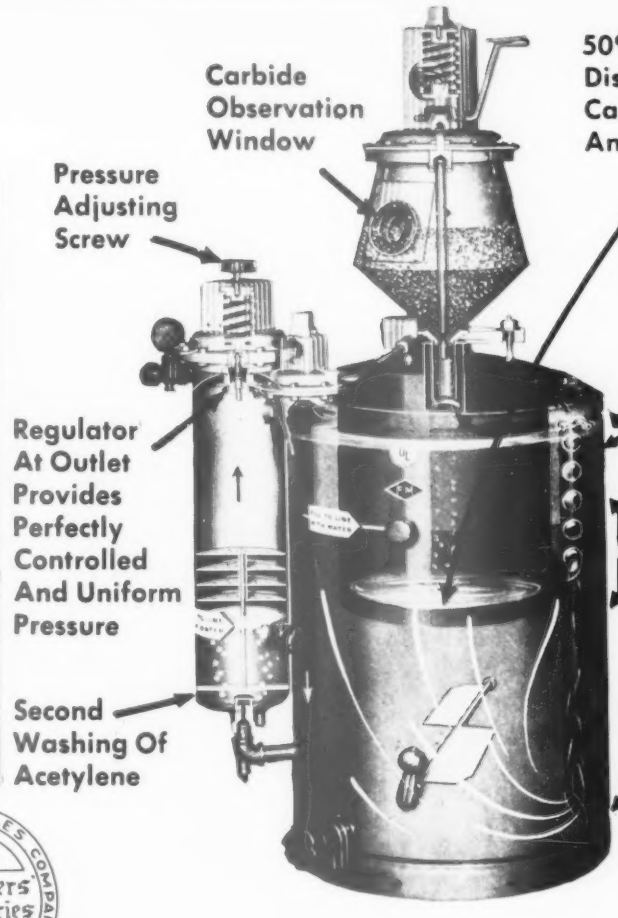
Stocked by a Dockson dealer near you.

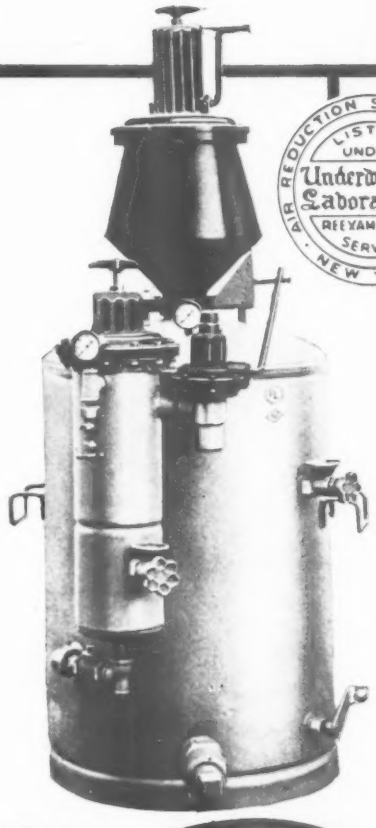
DOCKSON CORPORATION
3839 Wabash • Detroit 8, Mich.

BUY VICTORY BONDS

USE NATIONAL CARBIDE FOR HIGHEST ACETYLENE YIELD

This "Air Lift" CIRCULATING SYSTEM provides cooler, acetylene gas


Carbide Observation Window
50% Greater Distance Between Carbide Feed And Water
Pressure Adjusting Screw
Gas Propelled "Air Lift" Circulates All Water In Generator. Acetylene Is Washed Here.
Regulator At Outlet Provides Perfectly Controlled And Uniform Pressure
Ordinary Generator Has "Hot Belt" At Water Surface
This Generator Has Increased Radiation Surface And All Water In Generator Is The Same Temperature
Second Washing Of Acetylene



TYPE "P"

AIR REDUCTION SALES COMPANY — LISTED UNDER Underwriters Laboratories RE-EXAMINATION SERVICE — NEW YORK

WITHOUT moving parts to wear, get out of alignment and cause trouble, the "Air Lift" principle – an outstanding feature of the new Airco Type "P" Portable Acetylene Generator – keeps all the water in circulation while gas is being generated.

This "Air Lift", coupled with greater radiation space between the carbide hopper and the water level, eliminates the "hot belt" and provides cool, clean gas, double-scrubbed by passage through the circulating system and filter tank.

A few of the other outstanding features of the Type "P" Generator include: quick, easy charging; observation window in carbide hopper; large opening sludge valve for fast draining; and large-size agitator to stir sludge for complete removal.

Efficient, sturdily constructed, the Airco Type "P" sets new standards for dependability . . . and permits the operator to devote his full attention to the work of welding or cutting.

It is made in three sizes, each approved for double-rated operation: 15-lb. size, 30 cu. ft. per hour; 30-lb. size, 60 cu. ft. per hour; and 50-lb. size, 100 cu. ft. per hour.

Your nearby Airco office will be glad to give you complete information. Call today, or write for Bulletin ADC 619-A. Air Reduction, General Offices: 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Co., General Offices: Houston 1, Texas. Represented Internationally by Airco Export Corp.

AIR REDUCTION
Offices in all Principal Cities

AIRCO

Portable
ACETYLENE GENERATORS

"459" Is Important in the List of *Conservation Welding* Materials

Amsco 459 Hard-Surfacing Welding Rod is highly effective for hard-surfacing parts which are subject to severe abrasion and moderate impact. This cast rod of high chromium, molybdenum and carbon content provides sound deposits with a Brinell hardness of 500-600 and an abrasion resistance which makes its use highly practical even where abrasion resistant steels are used for wearing parts. Where ordinary mild steels are employed for punished parts the application of No. 459 is an economic necessity.

Application of Amsco 459 has given a much longer useful life to such parts as plow shares, dipper teeth, rolling mill guides, drag chain, coal cutter bits, pump shells and impellers operating in sand, pug mills, muller and mixer parts, scarifier teeth, cement block tampers, scraper blades, shredder knives and many other parts that are subjected to the abrasion of loose gritty materials or friction from contact with other metals.

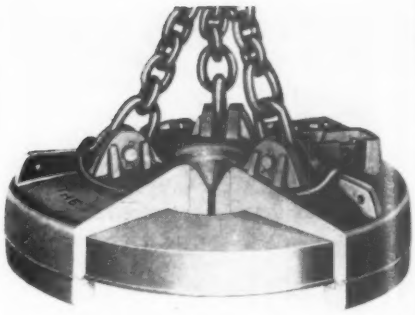
This hard-surfacing rod saves large sums annually for construction firms, mine and quarry operators, cement mills, steel mills, clay products plants, highway departments, farmers and general industry. A typical application is pictured (C-337B). Here, a 7 ft. cement clinker grinding ring with an 8" face for a Hercules mill which, after being coated on inside and sides with 459, gave 4,442 hours service at a cost of 12.45 cents per hour. We have numerous similar case studies in our files. The labor and material cost involved in applying 459 is more than justified by the savings that result.

Bulletin W-20A simplifies the use of 459 Rod, and Bulletin 941-W covers all Amsco Conservation Welding Products.

Amsco Welding Products in Canada are manufactured and sold by Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ontario.

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

AMERICAN Brake Shoe COMPANY



Type SW watertight lifting magnet. Note how the coil is welded into the housing.

All-Welded Lifting Magnet

★ The Type SW all-welded circular lifting magnet is announced for the handling of pig and scrap iron, slabs, castings and similar materials. The magnet differs from conventional construction in that the coil is enclosed in a metal case and hermetically sealed by continuous welds. In the accompanying picture, the housing has been cut away to show how the coil is welded into the housing to provide a double seal against the entrance of moisture.

The inner and outer pole shoes are also welded in place to form a streamlined magnet with straight sides. The coil case is vacuum treated after welding and filled with a thermosetting plastic compound, which is baked until it polymerizes to a stable condition. The all-welded, watertight construction permits the safe use of the magnet in underwater salvage work or in cooling pits and other applications where moisture is excessive. **The Electric Controller & Mfg. Co.**, 2700 East 79th St., Cleveland 4.

» «

Garibay "350" electrode holder. It offers a number of features to increase welding efficiency.

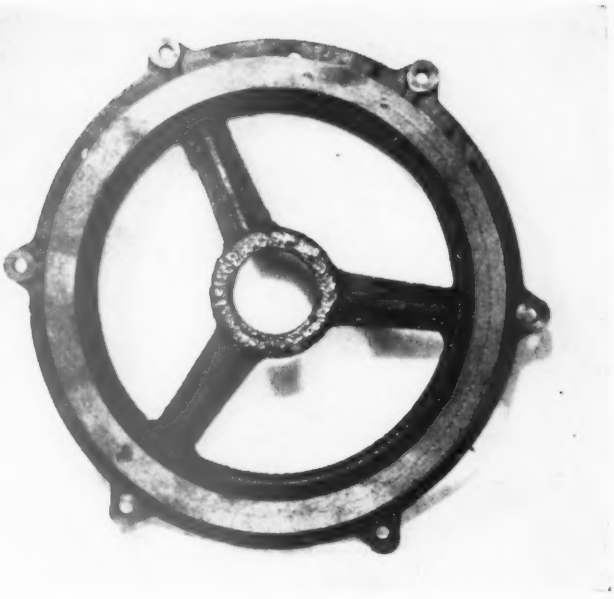
All-Purpose Electrode Holder

★ The Garibay "350" electrode holder is light in weight (17 oz) and carries up to 350 amp of continuous current. Features are: (1) offset jaws that provide a full view of the work at all times and permit welding to be done in hard to reach places; (2) all of the coated portion of the electrode is used; (3) it is never necessary to bend the rod and so break the flux; (4) full-throat construction provides an easy flow of current with a minimum of resistance; (5) ventilated construction gives cool handling; (6) a mechanical cable connector. **Yarco Distributors**, 215 West 7th St., Los Angeles 14, or 120 Wall St., New York City.

No Distortion
No Shrinkage Cracks
No Hard Spots

When You Arc Weld
Gray Iron Castings with

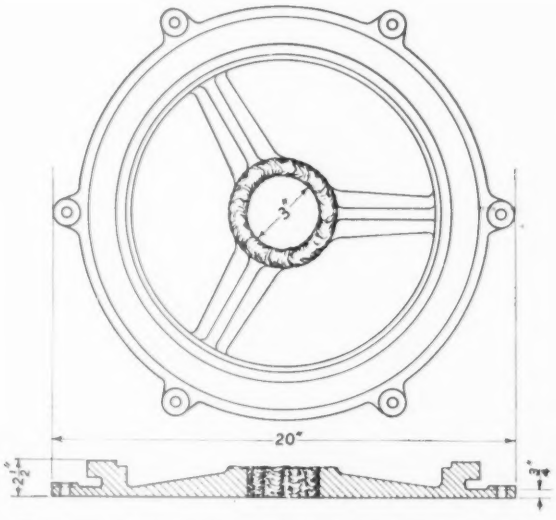
PHILLIPS "600" Electrode



The job illustrated is typical of the savings that are made every day in hundreds of plants, by arc welding with PHILLIPS "600" Electrode. Regardless of who makes the mistakes, they can be corrected through the use of PHILLIPS "600", and the labor that has been expended on producing the castings does not have to be thrown away.

In these plants the cost of castings is reduced because scrap losses are practically eliminated. They are also able to use castings of more intricate design, because defects are so easily corrected.

For correcting mistakes or defects, for effecting design changes on castings already machined or for salvaging worn castings, PHILLIPS "600" Electrode offers the advantages of full machinability, perfect color match and low cost of application. Our distributor in your locality will gladly furnish additional information.



The bore of this cast iron spider was built up by depositing successive overlapping beads of PHILLIPS "600" Electrode straight across the bore from one edge to the other. In all deposits after the first arc was held mostly on the previously deposited metal. This procedure avoided porosity and assured best machinability. One finishing bead around each edge (also applied by holding the arc on the previously deposited metal) provided enough metal so that the bore could be machined squarely. The casting was machined to proper size with complete success.

★

Our "4 Ways" book is a manual of procedures for various applications of metallic arc welding to gray iron castings. Send for your copy TODAY.

C. C. PHILLIPS & COMPANY

2750 Poplar Street
Detroit 8, Michigan

332 So. Jefferson St.
Chicago 6, Illinois

MANUFACTURERS AND DISTRIBUTORS OF WELDING ELECTRODES AND SPECIALTIES

News of the Industry

AWS Executives Meet in New York, Oct. 18

In compliance with ODT requirements, the American Welding Society will limit its 26th annual meeting to a one-day affair to be held at the Hotel Pennsylvania, New York City, on October 18. The activities will be confined to the annual business meeting, the award of medals, a directors' meeting and possibly a section officers' conference. Attendees will of necessity be limited to officers and directors, section officers and other "bigwigs" of the Society.

The tentative program calls for the meeting to be opened at 9:30 a.m. with the award of prizes, medals and honorary memberships. Dr. Samuel L. Hoyt of Battelle Memorial Institute will then present the third annual Adams Lecture. The annual business meeting will open at 2:00 p.m. with the installation of new officers. This will be followed by a meeting of the new board of directors.

An evening meeting will be held, if possible, in conjunction with the 25th anniversary celebration of the New York Section of AWS.

» «

ASM to Aid Veterans with Refresher Courses in Metals

Returning veterans who entered the armed forces from the metal industry are being offered an extensive program of free refresher courses by the American Society for Metals, 7301 Euclid Ave., Cleveland 3. The specific phases of direct interest to the individual veteran will be emphasized, according to W. H. Eisenman, national secretary of the Society. The refresher program will operate through the 68 local chapter groups of ASM, each of which will select a committee composed of experts in the field to be reviewed for the benefit of the veteran. The service will be free and available to all veterans returning to the metal industry, whether they are members of the Society or not.

» «

Ampco Metal Produces Film, "Golden Horizons"

A new industrial motion picture, *Golden Horizons*, has just been released by its producer, Ampco Metal, Inc., Milwaukee 4. This film tells the story of the development of copper-base alloys from the first discovery of copper by primitive man. It is a 16 mm film in color with narration and sound—written, produced and acted entirely by Ampco employees.

» «

Motion Picture Portrays Thermit Welding of Ships

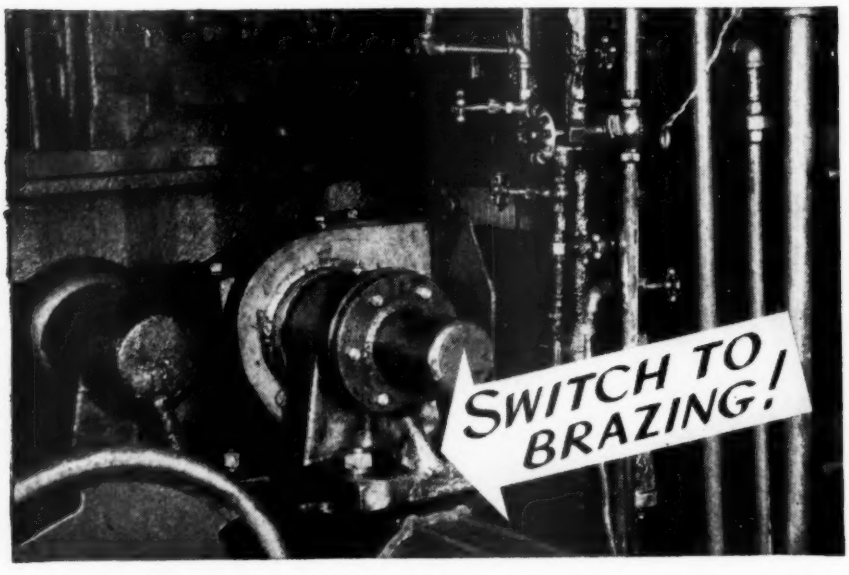
Fabrication of stern frames of cargo ships by thermit welding is dramatically portrayed in a 16 mm sound and color motion picture made for the Metal and Thermit Corp., New York City. The 20 minute film completely visualizes the thermit process by which thousands of stern frames were welded during the war. Prints are available without charge for showings.

» «

Welded Ship Construction Saves 2,000,000 Tons of Steel

Savings of over 2,000,000 tons of steel, valued at more than $103,000,000 were effected in cargo ships alone by the use of welded construction, it is estimated by the U. S. Maritime Commission. The estimate is based on figures released in a report by the Maritime Commission showing steel savings of approximately 821 tons per ship. With steel selling at $42 a short ton, this represents a cost saving of over $34,000 per hull.

The figures thus calculated apply only to the production of the 3,000 deep-sea cargo vessels completed by the shipyards of the United States. Similar reductions in costs and materials have been effected by welded construction for practically all types of other ships.



Conveyor Bearing Bracket Brazed with BRIDGEPORT BRONZE

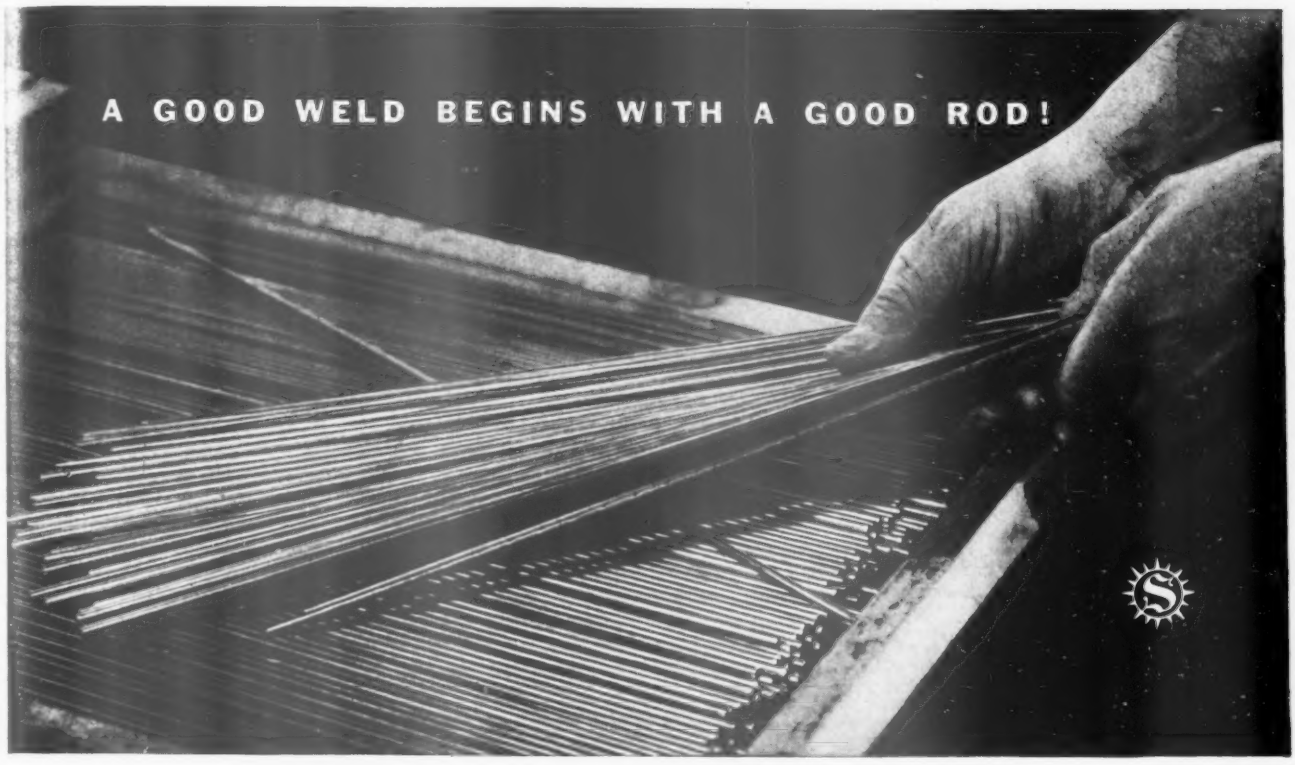
This bracket holds one of the main bearings on the reversible conveyor of a 2-high hot rolling mill and thus takes considerable strain. A break occurred at the base and an entire new half was built up with Bridgeport Bronze Welding Rod. No dismantling of equipment or expensive preheating with slow cooling was required. Time and labor were saved—yet the weld is stronger than the parent metal itself.

Consider the advantages of using Bridgeport Bronze Welding Rod for maintenance and repair of equipment—large or small. Repairs are made more easily and quickly and are stronger than by other methods. Only local preheating to a dull or cherry red is necessary to permit the molten bronze to adhere.

Wearing surfaces on pistons, shafts, bushings, gear teeth and stripped threads can also be built up with highly satisfactory results by this method. Write for a copy of our booklet on the selection of alloys and suggested methods for brazing (bronze welding).

"Bridgeport" BRIDGEPORT BRASS COMPANY
BRIDGEPORT 2, CONN. • Established 1865

Bronze Welding Rod A PRODUCT OF **BRIDGEPORT BRASS**



For Ductile, Homogeneous Welds Of High Tensile Strength

Processors of welding rods should remember that, first, last and always, "a good weld begins with a good rod." It's the rod that does the holding. Not only must it melt easily and flow smoothly into crevices, but it must also have the strength to stand high tensile strains.

Getting strength and ductility into Seymour Phosphor Bronze Welding Rods is a *precision* job. Into these rods goes an average lifetime of experience in the manufacture of bronzes and other nonferrous alloys. There is never any guess work. The component metals are the very best obtainable. The casting is done in modern electric furnaces under accurate heat control. A well-equipped laboratory tests every melt.

Safeguard your reputation. Standardize on SEYMOUR.

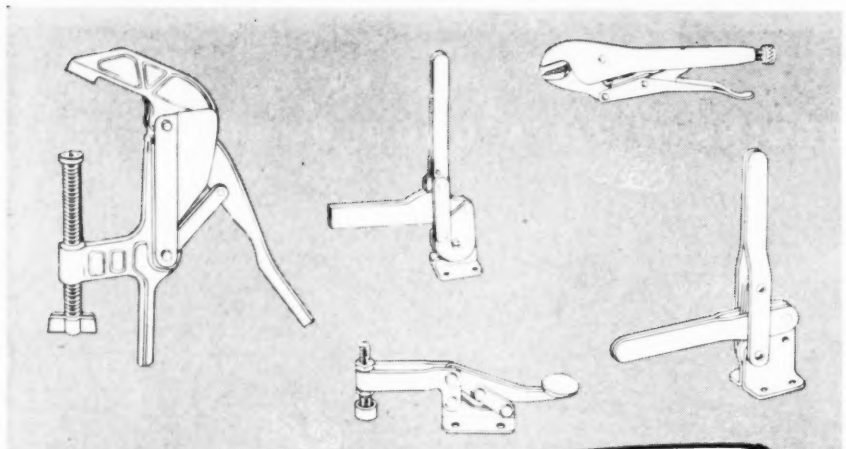
SEYMOUR

PHOSPHOR BRONZE WELDING RODS

GRADES A - C - D

THE SEYMOUR MANUFACTURING CO., SEYMOUR, CONN.

NONFERROUS ALLOYS SINCE 1878



Convert Clamping Time Into Production Time

USE **KNU-VISE** CLAMPS

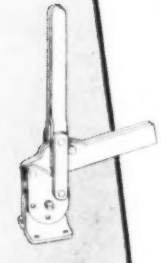
—that will grip work instantly and release it just as quickly.

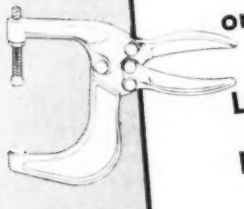
Utilize for production the time you now waste in tightening and loosening clamps on work. Only a flick of the lever is required to apply desired pressure and reverse motion to release.

There is a Knu-Vise clamping device for holding any sized part—under any condition—to meet any space accommodations—for welding, drilling, assembly, or fabricating operations.

Let us show you how you can speed production through better clamping.

Send for complete catalog.





KNU-VISE INCORPORATED

1336 PLUM ST. DETROIT 16, MICH.
4328 SAN FERNANDO RD. GLENDALE, CALIF.

Pullman-Standard Buys Ship Assembly Building

Pullman-Standard Car Mfg. Co., Chicago, has made ready for full-scale railroad-car building by purchasing the huge ship assembly building which was built at the south side Car Works. The purchase was made from the Bureau of Ships of the Navy Department for the sum of $927,472. The building will form the nucleus for a new passenger car body shop.

The new shop will take the place of the present steel shop, which was originally designed and built for riveted passenger cars. During the 1930's the steel shop was converted for the manufacture of welded lightweight rolling stock. The new shop will provide the largest and most modern steel construction facilities in the world for building passenger car frames on a production basis.

The present ship assembly structure has an area of 171,000 sq ft. In the conversion, it will be expanded to cover an area of 348,000 sq ft. In addition it will have a covered section of another 40,000 sq ft for steel storage. The electrical distribution systems throughout the plant are being modernized to provide for the extensive use of arc and resistance welding. Altogether, the company proposes to spend approximately $5,000,000 on its rehabilitation and improvement program.

» «

Budd to Spend $16,000,000 for Plant Expansion Program

A two-year reconversion and expansion program costing $16,000,000 is under way at the Philadelphia and Detroit plants of the Edward G. Budd Mfg. Co. Of this total, $4,000,000 will be spent before the company's reconversion program is completed. The balance will provide the plant expansion necessary to handle an annual sales volume in excess of $125,000,000.

At the Hunting Park plant in Philadelphia, expanded automobile production equal to approximately three times the prewar annual average is expected to hit its peak about June, 1946. This will necessitate the expenditure of approximately $6,000,000 for new welding equipment, presses, conveyors, etc. Renovations, enlargements and repairs to existing buildings will absorb another $500,000.

Reconversion of the Detroit plant and expanding it to care for additional automobile body production will cost in excess of $3,000,000. Equipment of Budd's numerous machine shops will take more than $500,000. Reconverting and equipping Budd's Red Lion plant, recently leased for the manufacture of from two to four stainless-steel railroad passenger cars per day, will cost $1,750,000.

» «

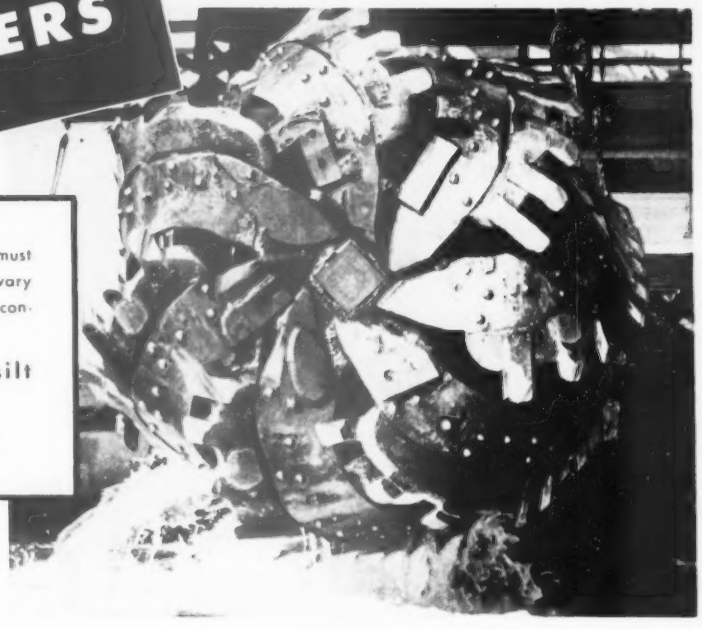
Square D Enlarges Milwaukee Plant

Square D Co. has such excellent prospects for broader use of its products that steps are being taken to double the size of the present plant at Milwaukee, according to F. W. Magin, president

THE Hard-Facing ANALYZER

THIS MONTH'S WEAR PROBLEM:

DREDGE CUTTERS



Selecting the proper hard facing alloy for any job must always be based upon operating conditions which vary infinitely between applications. Here are operating conditions imposed upon DREDGE CUTTERS:

SEVERE EROSION of water and silt against cutters.

IMPACT AGAINST submerged debris.

EFFICIENCY of all cutting edges rapidly deteriorates as wear destroys sharpness. Dredge cutters are no exception. Erosion of silt in water, which moves past cutters at high velocity, plus continued collision with gravel and submerged debris, greatly limits useful life of cutters and causes considerable downtime for cutter changes. Furthermore, as cutting edges become dull, their thickness increases with additional loss of digging efficiency.

To increase wear resistance, teeth and blades are now protected with Tube Borium. Not only is 300 to 400 per cent longer dredge cutter life obtained, but cutting edges are *self-sharpening*. Deposits of Tube Borium may be reapplied as required.

Of all hard-facing alloy types, Tube Borium is *first* in wear resistance. Graded particles of tungsten carbide, the hardest and longest wearing of all man-made metals, are encased in mild steel tubes. When applied, the molten tubing forms a solid matrix surrounding each carbide particle and produces an almost abrasion-proof surface. 3/16" Tube Borium is available for either electric arc or oxy-acetylene application. Priced at $3.15 per lb., f.o.b. Whittier, Calif., or distributors' warehouses.

APPLICATION Electric Tube Borium is applied on leading faces of blades and cutter teeth. Dismantling of the cutter head from the dredge is unnecessary. Inspect periodically and rehard-face as wear occurs.

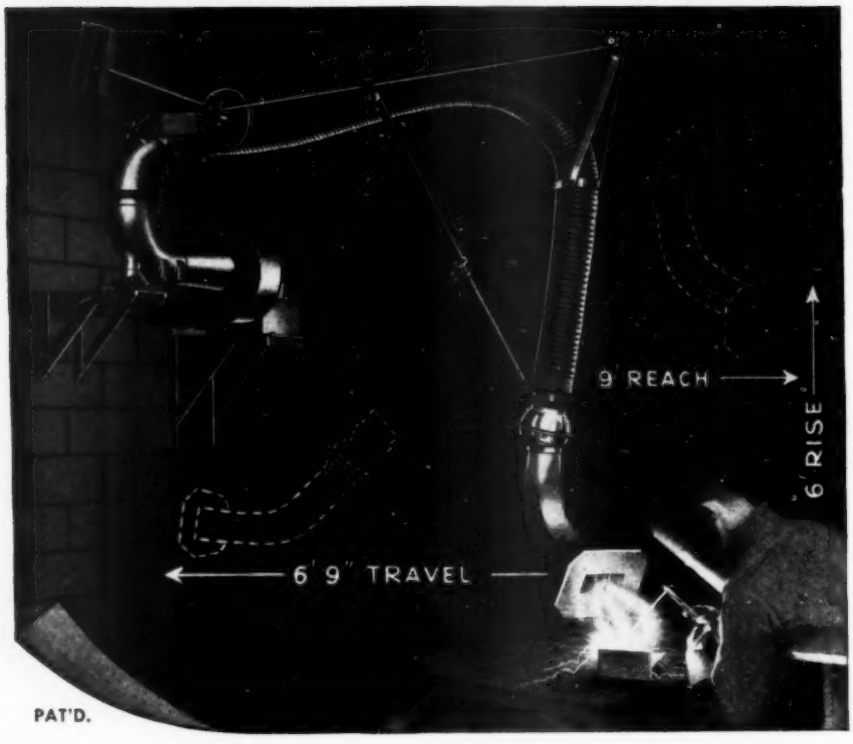
STOODY COMPANY

1141 WEST SLAUSON AVE., WHITTIER, CALIFORNIA

STOODY HARD-FACING ALLOYS

Retard Wear **Save Repair**

RUEMELIN Fume Collector



PAT'D.

REMOVES WELDING FUMES

At the Source!

No longer need your employees inhale welding fumes. A Ruemelin Fume Collector solves the problem, quickly and efficiently. It produces a powerful suction that draws out noxious gases, smoke and heat *at the source*. Guards employee health, resulting in less welder fatigue, therefore greater plant output. Has many exclusive features: (1) Clears shop air with minimum loss of building heat. (2) Exhaust snout can be positioned instantly and conveniently. (3) Covers maximum welding territory, vertically, horizontally and by circle swing. (4) Shipped completely assembled, easy to install. Thousands of Ruemelin Fume Collectors now serving war industries. 9 ft. and 15 ft. sizes (radius of swing).

We gladly offer engineering service for your fume collector installation. Write for Bulletin 37-C.

RUEMELIN MFG. CO.

3880 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

MANUFACTURERS AND ENGINEERS

SAND BLAST AND DUST COLLECTING EQUIPMENT, WELDING FUME COLLECTORS

A 4709-$\frac{2}{3}$-R

Budd Introduces New Designs for New Traveling Bedrooms

Welded stainless-steel railroad passenger cars embodying revolutionary improvements will go into production late in the fall at the huge new plant of the Edward G. Budd Mfg. Co. in Philadelphia. Several new types of sleeping cars, known as "Double Bedroom," "Cabin" and "Budgette," will provide facilities and conveniences never before available in moderate-priced accommodations.

The "Double Bedrooms" are of two types. To satisfy passenger preferences, half the rooms will be arranged across the car and the other half lengthwise. All rooms will be equipped with two full-width berths, pre-made and ready for use when lowered into position. A fully enclosed toilet, lavatory and shower bath provide privacy with apartment luxury and convenience. By opening the partition, two Double Bedrooms may be readily converted into a Master Room —a luxurious apartment with four beds, two enclosed toilets and washrooms with shower baths.

Another new stainless-steel sleeping car, the "Budgette," is intended to replace the old-fashioned open-berth sleeper, now considered obsolete. It will provide private-room accommodations in a standard 85 ft car for more passengers than can be accommodated in the pre-war standard 12-section drawing room sleeping car. Budgette rooms will have full-sized pre-made beds which can be moved into place or stowed away with ease. Each room will have its own toilet, wash basin, medicine cabinet and other appointments for the traveler's comfort. Other features are a comfortable day seat or chair, wide windows, ample luggage space, modern lighting and individually controlled air conditioning and heating.

* *

Navy to Continue Suggestion Program

The U. S. Navy's Beneficial Suggestion Program will continue as a peacetime measure, Under Secretary of the Navy Artemus L. Gates announced last month. He stated that the first year's savings on the more than 17,000 adopted ideas submitted by civilian employees exceeded $60,000,000 during World War II. These savings, however, represented only a portion of the benefits, the saving in time being even more valuable, Secretary Gates pointed out.

The suggestions for which awards were paid were submitted by workers at navy yards, air stations, ammunition depots, torpedo stations and various other types of shore establishments. They ranged all the way from skillfully designed tools, jigs and fixtures to new and ingenious methods of construction and repair. In addition, several new instruments were invented by navy technicians outside of their assigned duties.

"We will continue to encourage the submission of constructive ideas so that the Navy may operate at the highest possible efficiency on a peacetime budget," said Secretary Gates.

PAGE *Welding* ELECTRODES

PAGE *Keeps On* MAKING NEWS FOR WELDERS

• Since this time last year, PAGE has made the following announcements to the welding industry:

1. **A new Hi-Tensile "AF" electrode for welding light-gauge mild steel, using AC or DC.**
2. **A new book about stainless steel electrodes and how to use them for best results.**
3. **A new stainless steel electrode for AC or DC.**
4. **A new book of information on the use of Hi-Tensile "AF" electrodes.**
5. **A new pocket-size manual of general information about electrodes and their use.**
6. **A new line of "midget" electrodes for welding very light-gauge mild steel.**

Here is tangible evidence that PAGE is keeping up with the times. For uniformly high quality electrodes and for up-to-date information about welding techniques, it will pay you to . . .

Get in touch with Page!

ACCO

Monessen, Pa., Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

TRADE MARK

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

Conversion Difficult? Not So, Say American Central Workers

Workers at American Central Mfg. Corp., Connersville, Ind., last month completed the last of a total of 492,429 jeep bodies built during the past 2½ years for Willys-Overland and Ford. Without a moment's interruption, production was then started on the bodies required for Willys-Overland's new CJ-2-A—peacetime model of the tough little reconnaissance vehicle. Initial contracts call for several thousand "civilian jeeps" per month to meet the demand already in evidence.

All-steel kitchen sinks and cabinets are other home front products which will shortly start rolling from American Central's production lines.

» «

"Living Room" Car Sets a New High in Travel Comfort

Plans for a "Living Room" car embodying comforts hitherto undreamed of by travelers were revealed last month by the Pullman-Standard Car Mfg. Co., Chicago. Containing practically everything but a fireplace, this successor to the old parlor car features revolutionary type chairs and a radical departure in seating arrangements. The seats will consist of two parts: a lounge chair with a reclining back and a folding ottoman. Instead of a straight-line row of seats along each side of the car, the lounge chairs are to be arranged in groups, giving parties of up to five travelers the feeling of possessing an exclusive section of the car by themselves. Some of the seats will parallel the length of the car; some will be transverse. Some seats will face the windows; others face away from the windows. Some will even be angled and comprise a semicircular unit.

» «

Build New Plant to Make Prefabricated Steel Homes

Gunnison Homes, Inc., one of the newer United States Steel Corp. subsidiaries, has announced plans for construction of a million dollar plant at New Albany, Ind., for production of prefabricated homes on a production-line basis. Expected to be completed by the middle of 1946, the new plant will have a capacity of 1,650 houses per year when operating on an 8 hr day or be capable of producing 3,200 houses on a double-turn basis.

"The prefabricated home industry has now assumed an important position in the housing field," said Foster Gunnison, president of Gunnison Homes. "The new plant will enable the company to meet a part of the increased demands for fine prefabricated homes."

Gunnison Homes, Inc. was established in 1935. Before the war it sold its homes through a dealer system in various sections of the country. Mr. Gunnison's announcement marked the first disclosure of the postwar plans of the concern since it became a part of U. S. Steel on July 1, 1944.

» «

Lepel Acquires Van Norman Induction-Heating Division

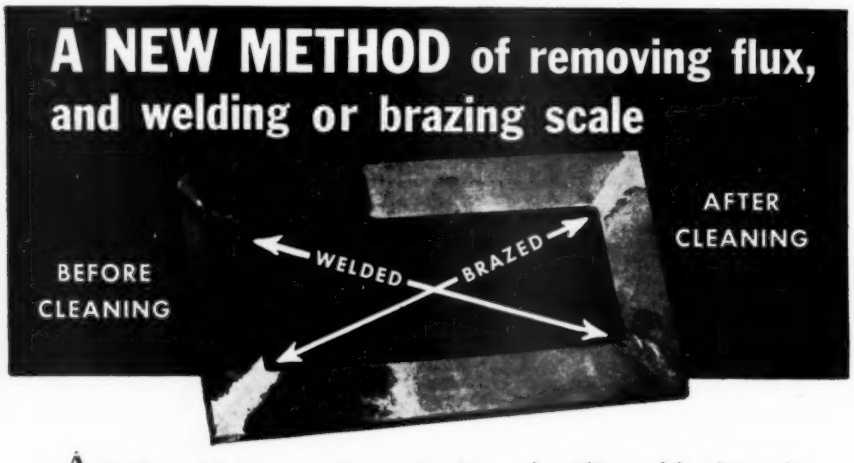
Lepel High Frequency Laboratories, Inc., pioneer manufacturer in the field of high-frequency induction heating, has acquired the business, goodwill and assets of the induction-heating division of the Van Norman Co., Springfield, Mass. Van Norman has discontinued the manufacture of induction-heating equipment and has advised all users of its units that inquiries relating to the sale, service or maintenance of Van Norman equipment are to be forwarded directly to Lepel High Frequency Laboratories, Inc., 39 W. 60th St., New York City 23.

» «

Plan Research Laboratory to Study High-Alloy Steels

A $5,000,000 postwar research and production expansion program has been approved by the board of directors of the Allegheny Ludlum Steel Corp. A modern research laboratory and related experimental and pilot plant equipment will be built at company headquarters, Brackenridge, Pa., to intensify studies of the structure, melting, processing and further development of high-alloy steels.

A cold-rolling mill of latest design for rolling stainless and silicon strip steels will be added to the company's plant at West Leechburg, Pa.



A highly satisfactory record removing flux, and welding and brazing scale has been hung up by OPTIMUS Deoxidant No. 3. It is being used to deoxidize the surfaces of a wide variety of metals and alloys.

Not a bright dip, and not intended to replace acid in ordinary pickling, OPTIMUS Deoxidant No. 3 being acidic in nature may be used on most metals as a mild deoxidant without serious etching of the surface. It is used regularly on welded steel tubing, brazed, hot rolled and cold rolled steel, copper, brass, welded aluminum, cast iron, bronze castings and most aluminum alloys.

As in the illustration above, in general, oxides are removed with the formation of very little or no smut, in contrast to the smutty surfaces frequently encountered. With the use of OPTIMUS Deoxidant No. 3 most welding and brazing scales are removed in from 5 to 15 minutes. Aluminum is deoxidized in 3 to 5 minutes; longer times tend to produce a smut with some alloys.

Material costs are low, using OPTIMUS Deoxidant No. 3, for consumption is largely a matter of replacing drag-out. No annoying or corroding fumes. Provides ease of operation; simply deoxidize for the required time; give work a quick rinse in hot water and the job is done.

SEND FOR a test sample of OPTIMUS Deoxidant No. 3. Sent when requested on your business letterhead, giving metals or alloys being welded or brazed.

Let Dependable **OPTIMUS DETERGENTS*** **and Processes Solve Your Problems in These and Other Related Operations. Cleaning metal before finishing; Preparation for welding; Ball Burnishing; Stripping for Refinishing; Cleaning for Maintenance and Inspection—In Hand or Machine Operations; In Metal Washing Equipment; Cold or Heated Tanks; Steam Cleaning Machines; Spray, Dip or Soak Operations.** ***Available in Alkaline, Acidic, Solvent and Emulsion Types.***

OPTIMUS DETERGENTS COMPANY

ENGINEERS AND MANUFACTURERS

282 CHURCH STREET, MATAWAN, N. J.

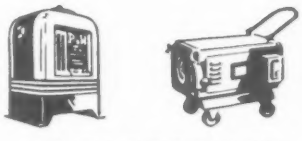
OPTIMUS DETERGENTS FOR INDUSTRY

How to master your cast-iron welding jobs

It's here! Not just another electrode, but the greatest contribution to the welding of cast iron — P&H "Harcast"! Over three years in the making, this new electrode brings amazing results — in easier welding . . . in better welds . . . in time saving. And it's available now for all your cast iron welding.

You'll like "Harcast"! The easy way it handles . . . the smooth weld deposits in all positions. No longer will you have the old troubles of weld cracks, poor penetration, excess porosity and pulling away at the fusion zone. "Harcast" ends all this — makes your cast iron welding simple and sure. Try it and see the difference!

"HARCAST" GIVES YOU—



AC OR DC WELDING

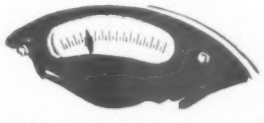
"Harcast" works equally well on either AC or DC. Now, whatever your machine — whatever the cast iron you have to weld . . . it can be done easily and with better results.

ALL POSITION WELDING

Downhand, vertical or overhead "Harcast" is an all position electrode — makes your welding of cast iron easier.

GREATER TENSILE STRENGTH

Sound, dense welds with a tensile strength of 60,000 lbs. p.s.i. — approximately twice that of a good grade of cast iron.

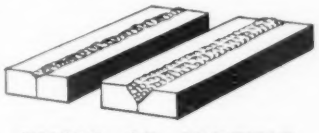


LOW AMPERE WELDING

"Harcast" was developed for low amperage welding to minimize dilution at the fusion zone, improve machining qualities.

WELDING STEEL TO CAST IRON

A feature that doubles the usefulness of "Harcast." It fuses well with mild or medium carbon steels for joining to cast iron.



SINGLE OR MULTIPLE PASS WELDING

Everything was considered in the development of "Harcast." That's why it is easy to use for single or multiple pass work.

WRITE TODAY FOR TEST SAMPLE OF P&H "HARCAST"

There's an electrode for every requirement in the complete P&H line. P&H welding electrodes are available in all sizes and types for fabricating — repair-welding — for rebuilding and hard-surfacing to provide unusual resistance to wear, impact and abrasion. Let P&H Field Engineers help you with your welding problems.

4513 WEST NATIONAL AVENUE, MILWAUKEE 14, WISCONSIN

A COMPLETE ARC WELDING SERVICE • WRITE FOR BULLETIN R7-3

P&H WELDING ELECTRODES

HARNISCHFEGER CORPORATION

WELDING ELECTRODES - MOTORS - HOISTS P&H ELECTRIC CRANES - ARC WELDERS - EXCAVATORS

Arctrol

SPEEDS *up* *your* PRODUCTION

Beating your competitors to market when your industry starts reconversion means speeding up all along the line . . . in design, in re-tooling and in production.

"ARCTROL" regulates generator output from full-rated current down to snuffing it out completely . . . merely by moving the foot pedal. It permits the welder to adjust the current for varying thicknesses of metal and for various welding positions. Craters are eliminated by "snuffing" out the current as the weld is completed. This means faster change-over from one kind of work to another . . . and faster production on all work.

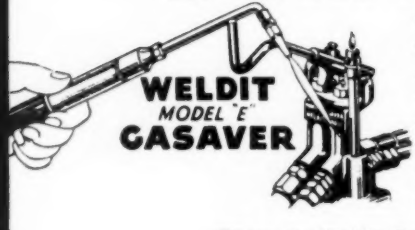
Ask your Welding Supply Jobber or write for Data Sheets and Prices. Specify welding equipment you use.

MULLENBACH ELECTRICAL MFG. CO.

2300 E. 27TH ST. LOS ANGELES 11 CALIFORNIA

Safe Welding

AT LOWER PRODUCTION COSTS



WELDIT *MODEL "E"* **GASAVER**

The Weldit Gasaver shuts off the welding flame when not in use. . . . Conserves essential materials by cutting oxygen and acetylene consumption as much as *fifty* per cent. Prevents injury to workmen—or sudden fires—from dangerous idle torch flames. . . . Adjustment remains unaltered between welds.

When the Weldit Gasaver has been installed, you simply hang idle torch on the handy lever rod. Weight of torch pulls rod down, thus automatically shutting off supply lines. Relight instantly by passing torch over Gasaver pilot light. No bother. . . . No time lost. . . . *No readjusting required.* . . . Price $10.00 at Detroit. Order today.

Better Soldering, Annealing and Heating Jobs

WELDIT *MODEL "CW"* **BLOW TORCH**

The Weldit Model CW Blowpipe is in daily use by many foremost industrial plants. . . . Built in accordance with the recommendations of leading fabricators of sheet metal products. . . . Operates on either natural gas, manufactured gas, or other low temperature fuel gas and compressed air. Stands up under rough shop use. . . . Send for literature.

WELDIT ACETYLENE CO.

628 BAGLEY AVENUE • DETROIT 26, MICH.

$9,000,000,000 Paid out in Ten Years of Social Security

In observance of the tenth anniversary of the Social Security Act, Paul V. McNutt, federal security administrator, made public a report showing that 4,250,000 men, women and children in all sections of the country are now receiving cash benefits that aggregate $111,000,000 a month. The report pointed out that since the act became law with President Roosevelt's signature on Aug. 14, 1935, social security payments to individuals have approximated $9,000,000,000. These payments are made under five complementary programs: the federal system of old-age and survivors' insurance, the state-federal system of unemployment compensation and the three state-federal programs of public assistance to the needy aged, needy blind and dependent children.

» «

H. C. Price Awarded Pipe-Line Contracts

H. C. Price Co., pipe-line and welding contractors of Bartlesville, Okla., has received contracts for three pipe-line constructions totaling 96 miles of 8, 10 and 12 in. pipe. These are:

Shell Pipe-Line Corp.: Taking up, reconditioning and relaying 30 miles of 10 in. oil line from Cushing, Okla., northeast to the Arkansas river.

Empire Southern Gas Co.: Laying 40 miles of 8 in. gas line near Andrews, Tex.

Oklahoma Natural Gas Co.: Taking up 26 miles of 12 in. gas line and laying 26 miles of 12 in. gas line from Chickasha to Stroud, Okla.

Construction has been started on the Shell and Empire Southern projects and will be started in October on the Oklahoma Natural Gas project.

» «

New Basing Point Established for Stainless-Steel Products

American Steel & Wire Co. has established a basing point at Cleveland to apply to all sales of U.S.S. stainless steel produced by this company in the Cleveland area. Cold-drawn wire, cold-rolled flat wire, cold-finished bars and cold-rolled strip are included, within the range of sizes produced by American Steel & Wire Co. in the Cleveland area. Previously, these products were sold on a Pittsburgh base.

New Distributorships

Mir-O-Col Alloy Co., Los Angeles; A & R Equipment Co., 638 East A St., Ontario, Calif.; Kyle & Co., 346 G St., Fresno, Calif.; Murrieta Machine Shop, Box 42, Murrieta, Calif.

» «

Tweco Products Co., Wichita, Kans.; Eastern Equipment Co., Inc., Willow Grove, Pa., for the Middle Atlantic states with Pennsylvania and West Virginia as the western boundary; O.K. Welding Supply Co., Cincinnati, for Ohio, Kentucky and the southern half of Indiana.

KEEP THE COOLANT ...inside!

ELECTROLOY'S New ELECTRODE HOLDER

Operator complaints and frequent maintenance shutdowns follow when spot welder electrode holders leak. To overcome this problem the Electroloy Co. offers a completely new holder with the following features:

1. Leak-proof construction, which replaces the conventional packing gland with a one piece rubber bonded to steel unit, permitting motion of the ejector ram through displacement of a flexible Neoprene diaphragm.
2. Stainless steel ejector ram and all non-ferrous construction, entirely eliminating rusting and sticking.
3. Compact design, permitting the water hose to lie close to the arm and providing greater clearance for bulky work.
4. Positive, instantaneous ejection of all tapered electrodes, by means of a light hammer blow.

FURTHER INFORMATION WILL BE SUPPLIED UPON REQUEST

THE ELECTROLOY COMPANY, INC.

BRIDGEPORT, CONN.

MANUFACTURERS OF ALL TYPES OF RESISTANCE WELDING ELECTRODES

ABOUT PEOPLE

Carl C. Torell, formerly in the sales and engineering department of Westinghouse and more recently manager of the welding division of Moore Machinery Co., San Francisco, has been appointed manager of a new branch of the Sullivan-Cassimus Co. located at 518 E. Pike St., Seattle. Sullivan-Cassimus also has offices in San Francisco and Los Angeles and is the Pacific Coast representative of The Federal Machine and Welder Co. of Warren, O.

Woodrow Boedecker, formerly assistant welding engineer, has been promoted to welding engineer of The Bastian-Blessing Co., Chicago. During his nine years with this company, Mr. Boedecker has been active in the development of the Rego underwater cutting torch, new tips for welding torches and new lines of scarfing and gouging tips.

» «

Dr. Harry G. Mitchell has been appointed advertising manager for the Speer Carbon Co. and its affiliate, the International Graphite & Electrode Corp., both of St. Marys, Pa. He returns to Speer after serving as carbon products consultant for the War Production Board since August, 1942.

A. Carl Tiedemann, long affiliated with Detroit's automotive industry in a manufacturing and sales capacity, was recently elected president of the Dockson Corp., Detroit manufacturer of welding and safety equipment and supplies. Mr. Tiedemann joined Dockson less than a year ago as executive vice-president and general manager.

» «

Harry G. Howell has joined Tube Turns, Inc., Louisville, as vice-president in charge of production. A native of Kentucky, Mr. Howell returns to the Bluegrass after four years as head of Oldsmobile's plant and a total of 22 years' association with General Motors.

» «

B. J. Brugge has been made welding engineer and district manager of sales and service for a new factory branch sales office of The Lincoln Electric Co. at St. Louis. His headquarters will be at 4427 Manchester Ave. For the past year Mr. Brugge has served The Lincoln Electric Co. in the Detroit area in assisting firms in the design and fabrication of war and postwar products. Previously, he had assisted Army Ordnance and the Navy and Maritime Commission with consulting services on welding, and before the outbreak of the war he had spent two years in Persia supervising welding operations in the construction of refineries and pipe lines.

» «

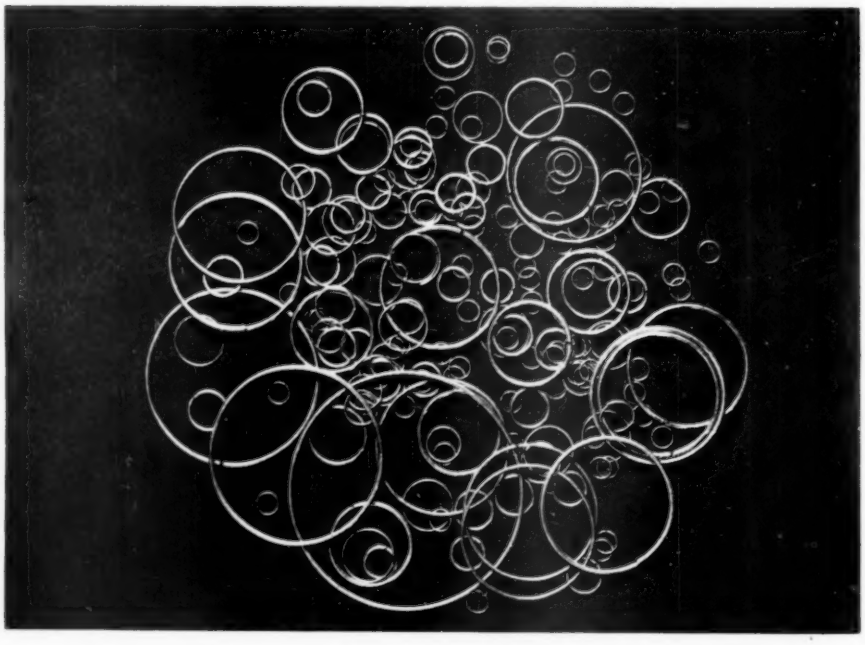
Lee H. Hill has resigned his position as vice-president in charge of industrial relations of the Allis-Chalmers Mfg. Co. to accept a post with the McGraw-Hill Publishing Co. in New York City. Mr. Hill had been active on the War Labor Board throughout the war, and he was President Truman's first appointee as full industry member of the board. He is also a nationally known authority on transformer design.

» «

William C. Van Cleaf, formerly assistant director, has been appointed director for industrial relations of the Allis-Chalmers Mfg. Co., Milwaukee. Mr. Van Cleaf has been with the company since 1912, serving in such positions as general supervisor of apprentice training and company employment manager.

» «

H. L. Heakin will represent the A. O. Smith Corp. in northern California, Utah and Nevada, with headquarters in San Francisco. He will handle all of the company's lines, which include pressure vessels, steel storage tanks, line pipe, oil well casings, railroad equipment, welding electrodes and consumer goods such as storage water heaters and domestic stokers. He was previously associated with the Worthington Pump and Machinery Corp., the Pacific Foundry Co., Domestic Engineering Corp., Union Switch and Signal Co. and Westinghouse Air Brake Co.



ALLOY BRAZING RINGS

The competitive market is here. Uncle Sam is no longer *the* customer. Lower production costs is a factor. Brazing Alloy Rings means fast, reliable low cost brazing. We make rings from Easy-Flo, Sil-Fos, Copper, Phos Copper and Aluminum in practically all sizes, likewise springs. Our preplaced rings speed production, assure uniform distribution throughout the joint. Easy-Flo is available in standard wire form. Speedy delivery at interesting prices.

CHARLES W. KRIEG COMPANY

52-60 Dickerson St. • HUmboldt 2-3445 • Newark 4, New Jersey

A *New* Resinoid Wheel for Weld Grinding

B-5

B-5 is the designation for a new and improved Norton resinoid bond for wheels in the soft and medium hard range. In shop after shop it is proving outstanding for weld grinding jobs of all kinds.

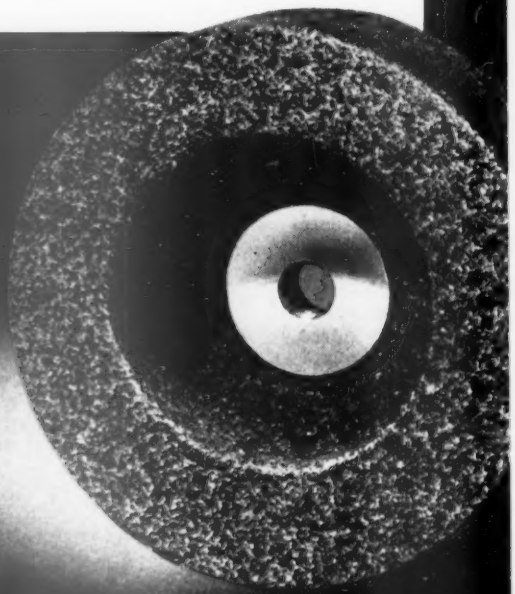
Operators like the fast, smooth cutting action of the Norton B-5 Resinoid Wheel and the way it hugs the work. Management likes the way it cuts costs—because of its faster cutting action and longer life.

It will definitely pay you to try the Norton B-5. Get in touch with your Norton abrasive engineer or Norton distributor.

NORTON COMPANY, WORCESTER 6, MASS.

Distributors in All Principal Cities

W-1029



NORTON ABRASIVES

are you looking for an

EXCELLENT HARD FACING *electrode?*

AGILE

AGILE DARK GREEN ELECTRODES

can be applied to the worn surfaces and edges of steel, malleable and cast-iron. The weld is a chromium-carbon steel with high hardness which gives excellent wear resistance. This electrode performs equally well with AC or DC welding machines.

APPLICATION: We recommend this electrode for the hard facing of:—machine parts, excavating buckets, plows, shovel teeth, worn tools, switches, crossovers, valves, dies, etc.

ANNEALING: 10-15 hours at 1460° F. and slow cooling will reduce the hardness of the weld metal from 600 to 280 Brinell.

FORGING: The weld deposit can be forged at 1800° F.

PRICES: AGILE Dark Green electrodes are packaged in 10-lb. containers at the following prices per pound:

3/16" diameter	$ .52 per lb.
5/32" diameter	.56 per lb.
1/8" diameter	.60 per lb.

AGILE ACTARC

AMERICAN AGILE CORPORATION

5806 HOUGH AVE.

CLEVELAND 3, OHIO

Jean Paul Elkann will be in charge of a new international division of The Titan Metal Mfg. Co. of Bellefonte, Pa. Mr. Elkann will make his headquarters at 70 Pine St., New York City. **Armand Elkann,** who has been a prominent member of the foreign trade and manufacturing community in Europe for the past 25 years, recently left New York for Europe on behalf of Titan Metal Mfg. Co.

» «

Edgar W. Bartz, formerly of East Pittsburgh and Trafford, Pa., has been transferred to the San Francisco Bay area as welding specialist for the Westinghouse Electric Corp. Mr. Bartz specialized in welding electrodes and materials when he was with the Westinghouse plant at Trafford. Previously, he had been a laboratory assistant in the company's motor division.

» «

William Martin, vice-president in charge of purchasing and traffic of the Philadelphia Quartz Co., manufacturers of silicates of soda, recently celebrated the completion of 35 years of continuous service with this concern. He was tendered a testimonial luncheon by the officers and directors, at which time a gold service emblem with a diamond was presented to him.

» «

H. J. French has resigned as assistant director for raw materials and facilities of the steel division of the War Production Board to resume his former duties as assistant manager of the development and research division of The International Nickel Co., Inc.

» «

E. B. Brant and **W. R. Stephens,** formerly at Monessen, Pa., will make their headquarters in the new Detroit office of the Page Steel and Wire Div. of American Chain & Cable Co., Inc. This new sales office has been established in the General Motors Building for the purpose of improving customer service in the Detroit area.

» «

N. A. Doolittle, 1850 East 16th Place, Tulsa, Okla., has been appointed representative in Oklahoma, southern Kansas and southwestern Missouri for Ampco Metal, Inc. Another Ampco representative, **W. W. Swan,** Carondelet Building, New Orleans, has been assigned a number of counties in southeastern Texas in addition to the states of Louisiana, Alabama and Mississippi that he was already covering.

» «

A. C. Monteith, head of the industry engineering department of Westinghouse Electric Corp. for the past four years, has been named assistant manager of headquarters engineering. He will direct headquarters engineering activities in the absence of **C. A. Powel,** who has been assigned to the military government of Germany. Mr. Monteith has also been appointed director of education for Westinghouse.

» «

Walter H. Bodle, formerly manager of the Square D manufacturing and assembly plant at Seattle, has been transferred to Detroit as assistant to the merchandise sales manager. **Ernest R. Walton** succeeds Mr. Bodle at Seattle.

» «

Kenneth H. Gayle, Jr., has been elected vice-president in charge of the northern division, sales and exports, of The Ingalls Iron Works Co. and its subsidiary, The Steel Construction Co. Mr. Gayle has been serving as northern division sales manager and export manager, with headquarters in New York City.

» «

Harry A. Winne, vice-president in charge of engineering for the General Electric Company's apparatus department, has been appointed vice-president in charge of engineering policy for the entire company. **Ernest E. Johnson,** assistant engineer of the aeronautics and marine engineering division, has been named to succeed Mr. Winne.

» «

Four men have been named to head newly organized sections in General Electric's control division, formerly known as the industrial control division. **William M. Anthony** is manager of sales of the industry control section; **Edward S. Bush** is manager of sales of the appliance and aircraft control section; **S. V. W. Dockstader** is manager of sales of the general purpose control section and **William J. Stock** is in charge of the marketing and promotions section.

» «

F. W. Elya has been appointed district manager, abrasive division, of the newly created northeastern district of the Norton Co. His headquarters are in Worcester, and the territory comprises Massachusetts, Rhode Island, Vermont, New Hampshire, Maine and New York state with the exception of southeastern and southwestern counties. **R. J. Forkey** will take over the western New York area formerly covered by Mr. Elya, and **Robert Cushman** from the Norton Worcester office will take over Mr. Forkey's former Syracuse territory.

» «

William C. Robinson, formerly assistant to the director of personnel relations for Lukens Steel Co. and its division By-Products Steel Corp. and Lukenweld, Inc., has been appointed assistant director.

» «

Ralph G. Rogers, factory manager for Republic Aviation Corp. at Evansville, Ind., has joined the American Central Mfg. Corp., Connersville, Ind., as works manager. Prior to the war, Mr. Rogers had been superintendent of Servel, In-

ru'tile, 1. rū'til, 2. ru'til, n. Mineral. An adamantive, reddish-brown, transparent to opaque tetragoval titanium dioxid (TiO_2), usually containing a small quantity of iron (F., shining, L. rutilus, red) ru'til.

SYNONYM:

RuFlux

TAMCO is . . . and has been for a number of years . . . the largest supplier of titanium compounds used in welding rod formulation, such as rutile, potassium and sodium titanate. Also, we furnish alloys such as 40% low carbon ferro titanium, nickel and manganese titanium for special coating formulation and compounds such as zircon, potassium zirconate, etc. Manufacturing operations covering these compounds are carefully controlled, and uniform products are assured at all times.

★ ★ ★

1. Ruflux 61—A 93% to 95% TiO_2 containing rutile milled to from 0.5% to 1½% on a 200 mesh screen. Major impurities are SiO_2, $ZrSiO_4$, Fe_2O_3 and FeO. Injurious impurities such as S. and P_2O_5 are kept to a minimum.

2. Ruflux 84—A 93% to 95% TiO_2 containing granular rutile of similar analysis to Ruflux 61. This coarser rutile is used to avoid coating dry cracking.

3. Ruflux P—A potassium titanate containing approximately 73% TiO_2 and 19% K_2O. This compound is used for arc stabilization purposes and contains no injurious impurities. Ruflux P is milled to approximately 4% on a 200 mesh screen.

4. Ruflux S—A sodium titanate containing approximately 80% TiO_2 and 15% Na_2O. Another arc stabilizer and formulated to reduce hygroscopic action to a minimum.

5. Ruflux Z—A zirconium silicate containing approximately 65% ZrO_2 and 34% SiO_2 combined as $ZrSiO_4$. The compound is milled to 0.10% on a 325 mesh screen and due to its high melting point (3850° F.) is used as a slag stiffener.

6. Ruflux P. Z.—A potassium zirconate containing 80% to 81% ZrO_2, 14% to 15% K_2O, 3% to 4% SiO_2 and smaller percentages of TiO_2, Fe_2O_3, CaO, etc.

7. Ruflux T—A zirconium oxide containing from 90% to 91% ZrO_2, 5.00% SiO_2, 0.80% Na_2O and lesser percentages of TiO_2, CaO, Al_2O_3, etc. Ruflux T is milled to 0.1% on a 325 mesh screen.

8. 40% Low Carbon Ferro Titanium—containing from 38% to 42% Ti., 3% to 5% Si., 6% to 9% Al., 1% to 2% Cr. The alloy is milled to minus 80 mesh.

9. Tam Nickel Titanium—contains from 25% to 28% Ti., 60% to 65% Ni., 6 to 8% Al., 2% to 4% Si., and 2% to 5% Fe. The alloy is milled to minus 80 mesh.

10. Tam Manganese Titanium—contains from 27% to 29% Ti., 35% to 40% Mn., 20% to 25% Fe., 7% to 9% Al and 2% to 4% Si. The alloy is milled to 80 mesh.

Tamco also manufactures alloys such as Ferro Carbon Titanium, Bortam and boron containing titanium alloys, and various other titanium and zirconium compounds.

We will be glad to produce any other titanium and zirconium compounds of interest to the welding rod industry as soon as the emergency is over.

It pays to include these compounds in your welding rod coating formulation research.

THE MERIT MARK OF METAL
TAM
METALLURGICAL
ALLOYS

A reasonable series of tests in your own plant will indicate the superiority of RUFLUX.

THE TITANIUM ALLOY MANUFACTURING COMPANY

Executive Offices: 111 Broadway, New York, N. Y. *General Offices and Works:* Niagara Falls, N. Y.

We are pleased to announce

Our Removal to Our Own Building.

LARKIN LECTRO PRODUCTS COMPANY

160 West 146th Street

New York 30, N. Y.

Manufacturers of Arc and Spot Welders

"EITHEREND" CABLE CONNECTOR

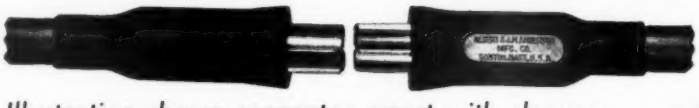


Illustration shows connector apart with sleeves

BOTH ENDS EXACTLY ALIKE
Neither male nor female

Center illustration shows connector protected by the insulating sleeves pushed together and locked, ready for work: butt rubber sleeves make waterproof joint.

Lower illustration shows solderless type of connector without rubber sleeves. Made in sizes from 4/0 to #10 soldered and from 4/0 to #6 solderless.

Send for Bulletin 49A

Albert & J. M. Anderson Mfg. Co.

289-305 A St. • **Boston, Mass.**

NEW YORK CHICAGO PHILADELPHIA LONDON

Lt. Col. C. F. Wiley, on leave of absence as secretary to Thomas Machine Mfg. Co., Pittsburgh, has returned to his former position following retirement from the Army. Lt. Col. Wiley served in the U. S. Army Coast Artillery, recently being stationed at Fort Monroe, Va., as secretary of the Coast Artillery School.

» «

Fred W. Eiselstein has been appointed to the newly created position of general traffic manager of the United States Steel Supply Co., Chicago. Until recently, Mr. Eiselstein was associated with the Office of Defense Transportation in Washington.

» «

Carl E. Anderson has been appointed director of industrial relations of the Warren City Mfg. Co., subsidiary of Graham-Paige Motors. He has been employed at the company and its predecessor, the Warren City Tank and Boiler Co., since October, 1942, his latest positions being assistant to the executive vice-president and assistant production manager.

» «

William E. Zipp, formerly manager of sales, has been appointed vice-president in charge of sales for the manufacturing division of Ceco Steel Products Corp., Cicero, Ill.

» «

Heber V. Lauer, formerly assistant division superintendent of coke plant and blast furnaces at the Gary Steel Works of Carnegie-Illinois Steel Corp., has been made field supervisor, raw materials, fuel and power division, Chicago district. **Jack H. Eisaman** has been appointed superintendent, number 2 electric furnace shop, South Chicago Works. He was formerly assistant superintendent of that plant's electric furnace and forge press department.

» «

Emil C. Ostlund, formerly assistant chief industrial engineer, has been appointed chief industrial engineer of American Steel & Wire Co., Cleveland. He succeeds **Cecil W. Guyatt,** recently named assistant to the chairman of operating committees, United States Steel Corp. of Delaware.

» «

Died . . .

John B. Berryman, chairman of the board of directors of Crane Co., Chicago since 1935, died recently in Chicago at the age of 83. He had been with the Crane Co. for 53 years, starting in 1885 as a bookkeeper in the plumbing supply company that later became Crane Co.'s Minneapolis branch. In 1911 he became secretary of the company, in 1914 first vice-president, and in 1932 he was elected to the presidency. He served in this capacity throughout the trying years of the depression, relinquishing the active management to younger men in 1935.

How Monel was used to solve a DIFFICULT FABRICATING JOB

Oil coolers for Superfortresses called for a strong, corrosion-resistant metal that could be worked, resistance-welded and soft-soldered dependably.

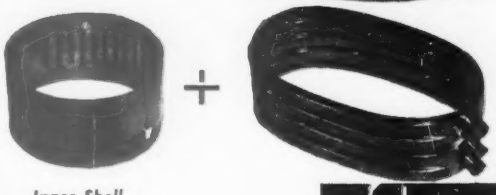
All-Monel shell for oil cooler. Made by Whitehead Heater Co., Vernon, Cal. Complete assembly by AiResearch Manufacturing Co., Los Angeles, Cal.

(Photos released through U. S. Army)

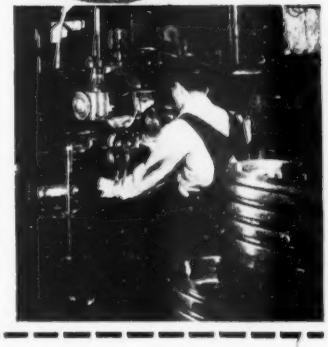
Inner Shell

1. WELDING IN ANGLES

After the inner shell has been formed from Monel sheet by punching and welding, Monel angles are spot welded on the inner surface to form channels for the baffles. Monel baffles, which also act as supporting struts, are spot welded in later.



Inner Shell *Outer Shell*



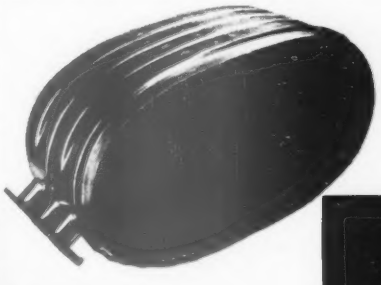
2. WELDING SHELLS TOGETHER

The outer shell is also formed from Monel sheet by punching, pressing and welding. Then, inner and outer shells are welded together. Vital dimensions are to very close tolerances.

Completed Shell

3. ATTACHING THE FLANGE

With baffles already in, the all-Monel shell is completed by silver-brazing on the Monel flange. Flange must be flat within 0.005". Baffles must be parallel and correctly spaced within ± 1/64".



Completed Cooler, with copper tubes soft-soldered in place

4. INTO A B-29 ENGINE

Using a jig, the finished cooler is installed in an engine of a Boeing Superfortress. The 92.5 lb. unit contains 32 lbs. of Monel, 50.5 lbs. of copper, 10 lbs. of soft solder. Monel is galvanically compatible with copper.

Look to the INCO Nickel Alloys whenever you need "tough" metals for "tough" jobs.

All are workable. All resist corrosion, rusting, heat, wear, stress and fatigue. Each also possesses certain specialized properties that fit them for specific jobs.

Chances are good that one or more of them can be used in your product . . . *to build-in the performance you plan!*

For more information on the metal that made this job practicable, write for: *"Engineering Properties of Monel."* Address: The International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y.

NICKEL (INCO TRADE MARK) ALLOYS

MONEL* • "K" MONEL* • "S" MONEL* • "R" MONEL* • "KR" MONEL* • INCONEL* • "Z" NICKEL* • NICKEL • Sheet...Strip...Rod...Tubing...Wire...Castings...Welding Rods (Gas and Electric)

*Reg. U. S. Pat. Off.

"Things will look up, when you start using

COLONIAL GLOVE AND GARMENT SPLITS

THEY INSURE THE MAXIMUM OF COMFORT... safety... and durability. All weights for men and women welders' gloves and garments, in large spread whole kips and side splits. Samples.

COLONIAL TANNING CO.
Glove and Garment Leather Division
MILWAUKEE, WIS.

Helpful Literature Just Published

The following reviews are of recent publications of interest to those in the welding industry. Unless otherwise stated, they may be obtained without cost by writing to the manufacturers listed.

Magnesium Gas Welding

Dow Technical Memorandum No. 10 contains six multigraphed pages giving useful information on the emergency repair of magnesium parts by gas welding. Two tables are included: one serving as a guide to the selection of welding rod diameters, tip orifice diameters, oxygen and acetylene pressures for metal thicknesses from 0.020 to 0.128 in. and another table giving the melting points and color identifications of magnesium-alloy rods for welding various Dowmetal alloys. Other topics discussed are the use of welding fluxes, operator's equipment, field repair of magnesium castings welding of castings to wrought parts, field repair of wrought magnesium, cleaning and painting. **The Dow Chemical Co.**, Magnesium Division, Midland, Mich.

New Electrode Specifications

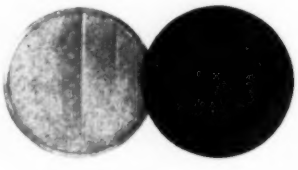
The American Welding Society recently released the 1945 "Tentative Specifications for Iron and Steel Arc-Welding Electrodes" carrying the designation A233-45T. The revisions embodied are primarily intended to clarify the text requirements previously laid down in specifications carrying the designation A233-43T, but some qualifications of the previous test requirements are made. More specific designations of the requirements for each classification and how the required tests are to be performed are among the important changes. For more ready reference, test conditions and results have been included in a tabular form, and a new table summarizing all test requirements has been added.

In the course of preparing the revised specifications, it was recognized that much data on electrodes, while not proper for inclusion as a part of the specifications, would be useful to guide potential users towards an understanding of the best-suited applications of the various electrodes classified. To provide this information, an appendix has been added to the specifications. Carrying the title, "Guide to AWS-ASTM Classification of Iron and Steel Arc-Welding Electrodes," this appendix explains the concept of the classifications numbering system used and discusses each electrode classified in the E-60 series as to type of coating, suitable currents, voltages and mechanical properties. A list of codes with which each classification complies is also included.

Copies of the revised code may be purchased for 25c from the **American Welding Society**, 29 W. 39th St., New York City 18.

Electrode Bulletin

Allis-Chalmers bulletin L6348-A has been brought up to date to include recommendations for the proper use of the newest additions to the company's electrode line. The new arrivals include a chrome-moly hard-facing electrode, nickel-manganese and mo-manganese welding electrodes and five types of stainless-steel electrodes. All of these are described in terms of their usage, contents, hardnesses and welding procedures. A new NEMA color chart and a recommended current chart are also included in the bulletin. **Allis-Chalmers**, Milwaukee 1.



W-AL-CO
COVER LENSES

for Gas Welding.
Spatter-resisting or plain.

GOGGLE LENSES (50 mm)

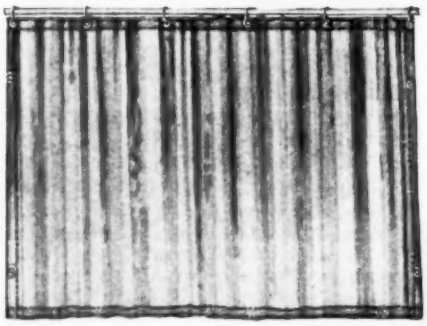
Protect Your Vision with the Best in Lenses and Plates

WELDING ALLOYS MFG. CO.
744 Broad St., Newark 2, N. J.

W-AL-CO

SUPER-PLATE FILTER LENSES for Helmets and Handshields.

"SAF-T" CURTAINS for Industrial Uses



Made of fine quality, heavy flame-proof duck.
Any size required.
Equipped with grommets ready to hang.
Color: Olive Drab.
SOLD THROUGH YOUR LOCAL JOBBER

FRED JESSAR
404 Denckla Bldg. Philadelphia 7, Pa.

Write for prices and descriptive material.

Welco Goggles - Helmets - Shields

EXCEL

In Design - Quality - Comfort - Performance

WELCO

Welders' Goggle
No. H 2

Cups are molded to facial contours for comfort and perfect exclusion of light, from impact resistant non-conductive THERMO-SETTING plastic. Unaffected by heat.

Fitted with Federal specification F Type, 50mm WELSHWELD lenses, shades 4, 5 or 6. Adjustable ball-chain bridge is covered with neoprene tubing. Non-corrosive metal baffles allow free circulation of air. All-rubber headband.

WELCO Welders' Cover-Spectacle Goggle

No. H 22 — This NEW design was specially developed for welders, cutters, etc., who wear prescription corrective glasses. Made of extremely strong, light weight plastic, and with cups roomy enough to give comfortable clearance of corrective glasses. Metal baffles give ample ventilation — exclude injurious rays.

BRIDGE: Leather, easily adjustable for comfortable fit.

HEADBAND: One-Piece elastic webbing.

LENSES: 50mm WELSHWELD F-Type lens. Federal Spec. Shades F-4, F-5 or F-6.

ALSO AVAILABLE with metal brace bar . . . Cat. No. H 24.

Welders' Flash Goggle
High Bar Spectacle Type

Non-corrosive polished metal frame. Flexible metal temples covered with plastic tubing. Easily adjusted by fingers alone. Also available with plastic nose pads.

For impact and flash protection. Fitted with 50mm WELSHADE hardened lenses. Shades 1.5 to 3.0 inclusive.

H 12-1 Metal side shields
H 12-2 Green acetate side shields
H 12-3 Clear acetate side shields
H 13 Without side shields
H 14 Leather side shields

For best results use WELSHWELD lenses and plates. They exceed requirements of Federal specifications.

WELCO FOG-FREE Goggle

It's AIR CONDITIONED

For General Protection — Not a Welding Goggle

At least 48 times a minute, normal breathing draws clean, filtered air into lens chamber to carry away moisture before it can fog the Polaroid* Non-Polarizing Plastic Lens. Keeps the goggle cool and comfortable. No fogging of inner surface of lens. No dust or flying particles can get inside to cut down vision or irritate the eyes. Lens exceeds Federal break test specifications.

HELMETS — 1-piece
HELMETS — 3-piece
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OPTICAL SCREW DRIVERS
POCKET SCREW DRIVERS All-steel

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WELSH MANUFACTURING CO.

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L-M Committee Guide

For over three years Labor-Management Production Committees have worked in individual plants to meet an unlimited assignment of increasing war production. Now they face equally difficult tasks in the changeover to civilian production. To aid in meeting some of these difficulties, the War Production Drive has just published a "Basic Guide for Labor-Management Committees" (32 pages, 5¾ by 8½ in.) describing ways of operating a labor-management production committee.

"This guide," the foreword explains, "is intended for management and labor groups which already have a committee or which may be considering the formation of one to aid them in meeting the changes which lie ahead." A copy of the booklet may be obtained from **War Production Drive Division** of the War Production Board, Washington, D. C.

» «

Cutting-Torch Catalog

Beautifully printed in many colors, a new 40-page, letterhead-size catalog (Form 52) is devoted entirely to Victor cutting tips and attachments. Hand and machine cutting torches, circle cutting attachments, underwater cutting torches, cutting torches and attachments for low-pressure fuel gases, standard cutting attachments and various styles of cutting tips to meet every purpose are described and pictured—some in their natural colors. The catalog also contains a useful cutting attachment and tip selection chart and a table of tip drill sizes and other necessary information for cutting metal in thicknesses ranging from 1/64 to over 16 in. **Victor Equipment Co.**, 844 Folsom St., San Francisco 7.

» «

Airco Price List and Catalog

An up-to-date price list and catalog of Airco gas welding and cutting supplies and accessories has recently been published. This 16-page booklet contains illustrations, descriptions, engineering data and current prices. Type of equipment covered include welding rods, brazing and welding fluxes, hose, brazing alloys, goggles and spectacles, gloves for gas welding and cutting, spark lighters and tips. Also listed are carbon rods and plates, hard-facing rods, cobalt-borium inserts, pea borium and other items. Copies of this price list, Catalog No. 40, may be obtained from **Air Reduction Sales Co.**, 60 East 42nd St., New York City 17.

» «

Ampco Gear Bulletin

Ampco bulletin 55, "Ampco Metal in Gears," is a four-page, letterhead-size folder describing the use of aluminum bronze in various gear applications. It includes a table showing the preferred grades of Ampco Metal for various types of gear service. **Ampco Metal, Inc.**, 1745 S. Thirty-eighth St., Milwaukee 4.

» «

Mogul Circulator Bulletin

Mogul bulletin No. C-1-A describes the company's new "Circulator" (See page 68, September, THE WELDING ENGINEER), giving information on its use, specifications and price. The two-page, letterhead-size sheet also gives information and prices on Mogul "Cast-Seal," the colloidal used for closing pores and pinhole cracks in castings. **The Metallizing Co. of America**, Industrial Div., 1330 W. Congress St., Chicago 7.

» «

Reconversion Folders

As the manufacturer reconverts his production to a peacetime basis, he may have to determine—more quickly than such a job has ever been done before—the exact condition of every piece of existing equipment he proposes to use in peacetime production. Suggestions for taking a reconversion inventory on three specific pieces of equipment—electric motors, V-belt drives and centrifugal pumps—are given in three letterhead-size folders recently issued by **Allis-Chalmers Mfg. Co.**, Milwaukee 1. The three folders are similar in appearance and each includes a reconversion inventory check list.

"Die-Less Duplicating" Eliminates Time Loss and Die Expense!

The DI-ACRO Bender is a precision unit, designed to form and duplicate an unlimited variety of parts and pieces—eliminating, in many cases, the need for special dies. Tubing can be accurately formed with the DI-ACRO Bender to a center line radius as small as 2½ times the outside diameter of the tube without distortion. Shapes and outlines, impossible to obtain with regular production dies, are easily formed with the DI-ACRO Bender. These include round, half-round, hexagon, and square rod, tubing, angle, channel, moulding, strip, stock and bus bar.

Stops may be set and material guides mounted for production work in excess of 1000 operations per hour. The Bender is compact and portable, ideal for temporary or permanent work. There are no extra parts to purchase, as the DI-ACRO Bender has been built to cover a wide working range, with simple conversions.

Peacetime production for industry, forecasts the return of Wrigley's Spearmint Gum—that favorite "help on the job," for workers everywhere. But Wrigley's Spearmint will be back only when conditions permit its manufacture in quality and quantity to meet your needs. Until that day, we ask you to remember the famous Wrigley's Spearmint Wrapper shown at right, as your guarantee of the finest chewing gum that can be made.

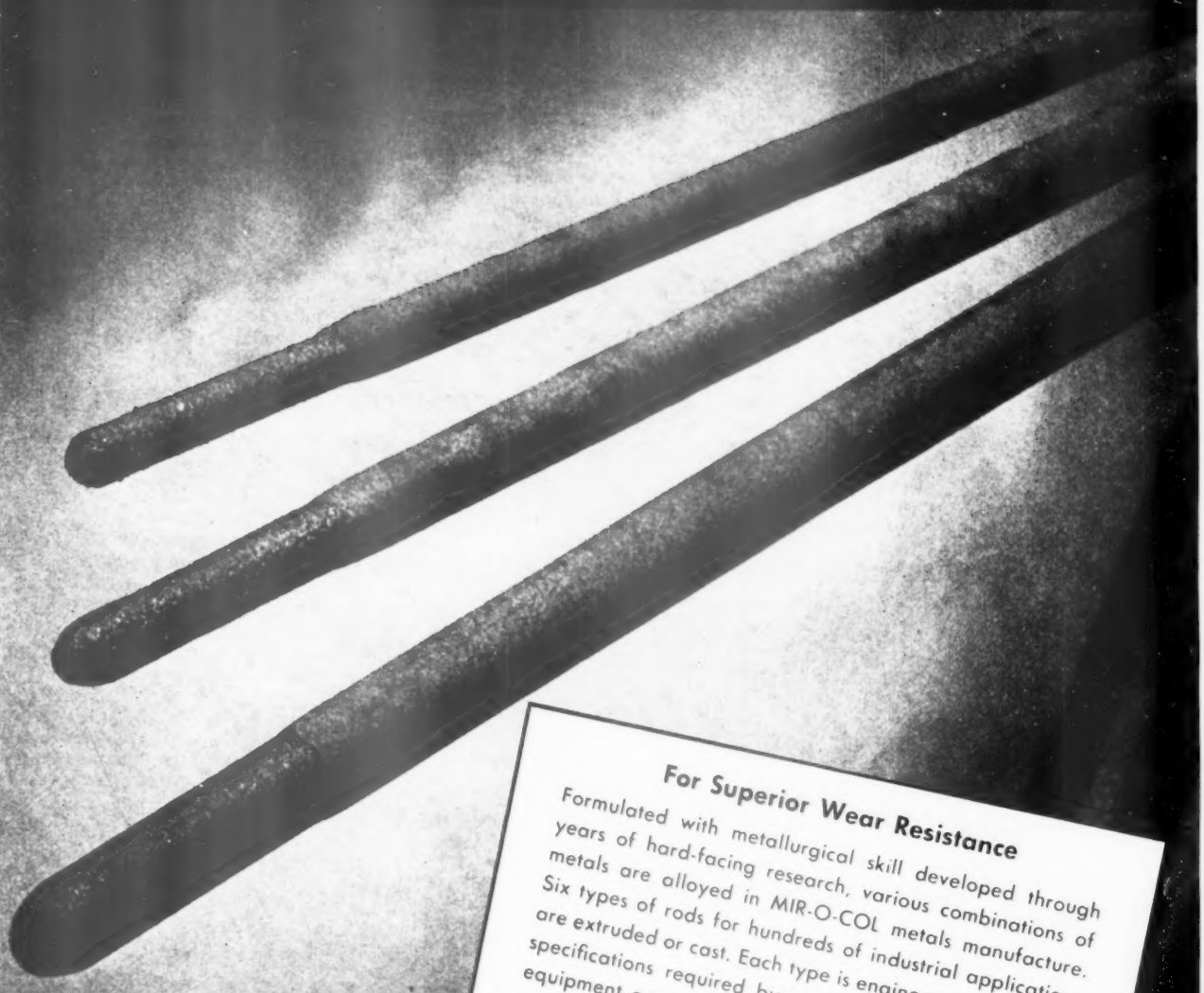
You can get complete information from O'Neil-Irwin Manufacturing Co., Minneapolis 15, Minn.

Typical Shapes Formed by the DI-ACRO Bender

Remember this wrapper

Z-86

HARD-FACING METALS



For Superior Wear Resistance

Formulated with metallurgical skill developed through years of hard-facing research, various combinations of metals are alloyed in MIR-O-COL metals manufacture. Six types of rods for hundreds of industrial applications are extruded or cast. Each type is engineered to meet the specifications required by on-the-job use. They protect equipment parts from wear resulting from abrasion, impact, corrosion, erosion or galling.

MIR-O-COL metal's superiority is the result of a designed OVERLOAD rating of tough hardness, high red hardness and deposition flexibility. Write at once to learn where these metals can help control your wear problems. Ask for your copy of the FREE MIR-O-COL Catalogue.

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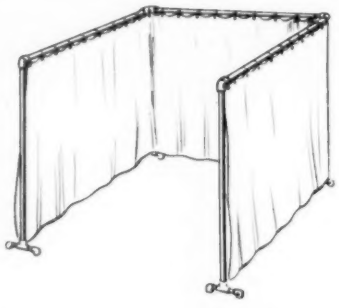

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Welding Booths

Heavy-duty, full weight, industrial canvas, ideal for welding booth partitions, and all industrial uses. Equipped with rust proof grommets set in reinforced patches. Easy and simple to erect and change to meet varying conditions. Available in a variety of stock sizes or special sizes to meet your needs. Write for prices. Immediate delivery.

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The Cincinnati Tool Co.
1944 Waverly Ave. Cincinnati 12, O.

"We of A. O. Smith"

Above is the title of an interesting 16-page, 6 by 9 in. booklet prepared to tell in print and pictures of some of the work going on in the 130-acre Milwaukee plant and six branch plants of the A. O. Smith Corp. Welding is, of course, given a prominent position in this booklet: "Of all the skills and 'know-how' for which we of A. O. Smith are well known, probably the most important is electric welding," the text states. "More than 25 years ago it became vital to develop our own arc welding electrodes. . . . Now we use more than 300,000 SMITHway electrodes daily in our own plants."

Other activities discussed include the fabrication of pressure vessels, automotive frames, pipe for oil lines and oil well casings, glass-lined tanks, home water heaters, centrifugal pumps, electric motors, petroleum meters, and the company's important contributions to the winning of the war. **A. O. Smith Corp.**, Milwaukee 1.

» «

Tool-Steel Manual

A 170-page, pocket-size catalog and manual entitled "The Tool Steels of Allegheny Ludlum" has just been released for distribution. Double the size of preceding editions, the new manual provides a straightforward coverage of tool steels for all uses and users. It contains many pages of technical data and is liberally illustrated. Thumb-indexing and sectional arrangement plus a full general alphabetical index make it easy to use. **Allegheny Ludlum Steel Corp.**, Brackenridge, Pa.

» «

Broadside on Metal Fabrication

Nooter of St. Louis has prepared an impressive broadside, printed in three colors and unfolding to 23 by 19½ in., to portray a few of its many jobs in alloy welding and fabrication, steel plate fabrication, special metal fabrication, steel boiler rebuilding, metal spraying, stack work, etc. **John Nooter Boiler Works Co.**, 1400 South Second St., St. Louis 4.

» «

Stainless-Steel Handbook

Eastern Stainless Steel Corp. has ready for distribution a 96-page handbook, "Eastern Stainless-Steel Sheets," written by Henry Schaufus, the company's chief metallurgist. The first 34 pages are devoted to a pictorial review of the uses of stainless steel in various industries, including transportation, architecture, food handling, hotels and restaurants, dairies, chemical processing, laundries, textiles, photography, hospitals and paper manufacturing. In the informative section which follows at least a page is devoted to each grade of stainless steel being manufactured by the company. Data are supplied on gauges, sizes, tolerances, finishes, processing and fabrication. A four-page "turn-out" spread gives important details on t properties of various stainless stee There is also a section on corrosion a the catalog is completed by a good s lection of general reference tables. **Eas ern Stainless Steel Corp.**, Baltimore 3

» «

Motor-Generator Maintenance

Motors and generators that have bee worked overtime and "round-the-clock on every day including Sundays an holidays need care to prevent shutdowns Useful tips for the reconditioning an maintenance of war-weary electrical ma chinery are given in a 40-page, letter head-size booklet, "Modern Motor-Generator Maintenance and Repair Equipment." This booklet, a combination manual and catalog of maintenance equipment, is available from **Ideal Commutator Dresser Co.**, Sycamore, Ill.

» «

Folder on Callinite Alloys

A four-page letterhead-size folder Callite bulletin 158 describes tungsten-copper and tungsten-silver alloys which are made by the powder metallurgical process and marketed under the name of "Callinite." This product is a high-conductivity facing material for high-current applications where pitting, sticking or welding of contacts is apt to occur. It is also suitable for facing arcing tips on circuit breakers, motor controllers, heavy-duty relays, industrial control contacts, etc. Each type of Callinite alloy—TC tungsten-copper and ST tungsten-silver —is available in three grades for specific applications as detailed in this folder. **Callite Tungsten Corp.**, 540 Thirty-ninth St., Union City, N. J.

» «

Meco Parts List

The new Meco Parts List No. 125 applies to the recently issued Meco catalog No. 120 described in this section last month (page 94, September issue). A copy of the parts list may be obtained by addressing **The Modern Engineering Co., Inc.**, 3403 Pine Blvd., St. Louis 3.

» «

Surface Grinding Folder

"Norton Cylinders and Segments for Surface Grinding" is the title of a new 5 by 7¼ in. (folded) mailing piece picturing and describing these products. **Norton Co.**, Worcester 6, Mass.

» «

Spanish Folder

An envelope-size folder printed in Spanish and entitled *"Comprobado en el Servicio"* (comprehensive in service) has been issued to describe "Ampco-Trode" coated aluminum-bronze weldrods for the benefit of Spanish-speaking welders. The folder will be distributed by Latin American jobbers and distributors. **Ampco Metal, Inc.**, 1745 S. Thirty-eighth St., Milwaukee 4.

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Gases for Cutting and Welding in all Construction and Demolition Work

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TRINDL SUPER INDUSTRIAL ARC WELDERS, the result of many years of careful engineering and "job tested" research, are rolling up impressive production records. Acclaimed for superior performance, ruggedness, dependability, and economical operation.

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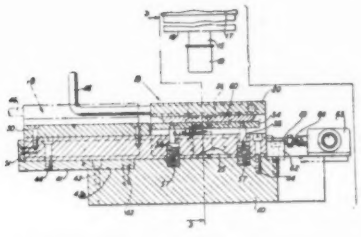
FROM THE PATENT OFFICE



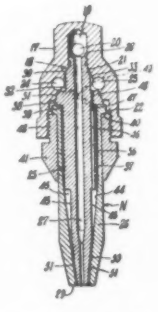
Resistance-Welding Apparatus

2,380,529. **Vincent G. Jarman,** Watchung, N. J., assigned to **Western Electric Co., Inc.,** New York City. Filed Jan. 7, 1944. Issued July 31, 1945.

Welding apparatus with a reciprocable electrode formed to engage a first article which is to be welded to a second article. Other elements are: a base of conductive material, a second electrode formed to receive the second article, rails for supporting the second electrode for movement between loading and welding positions and means to support certain of the rails adjacent the welding position for movement by the reciprocable electrode. The second electrode then moves into engagement with the base.

» «

Torch Tip

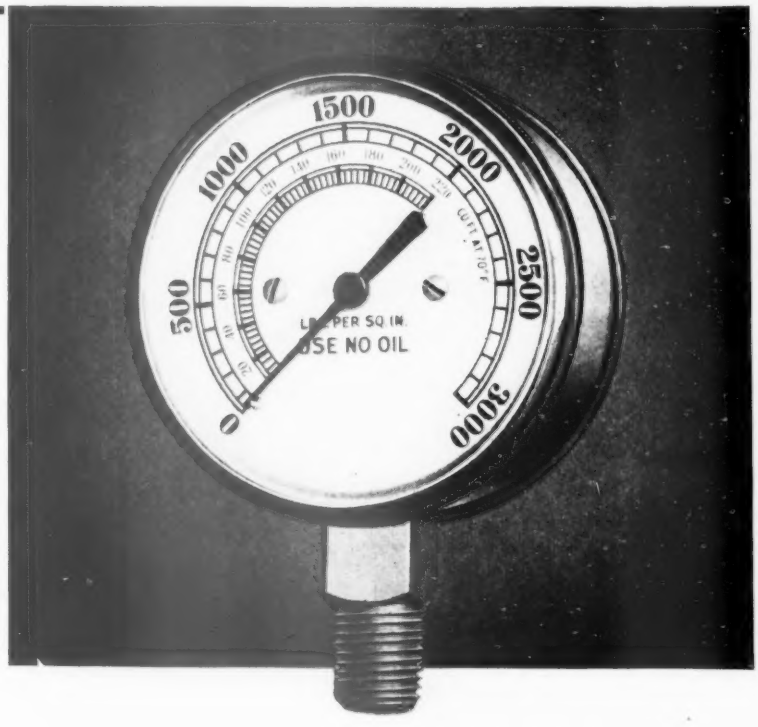


2,380,570. **Roger S. Babcock,** Plainfield, N. J., assigned to **Union Carbide and Carbon Corp.,** New York City. Filed June 21, 1941. Issued July 31, 1945.

A tubular torch tip having an axial oxidizing-gas passage extending from the inlet to the outlet end. The inlet end is provided with a circumferential engaging portion having an annular seat surrounding the oxidizing-gas passage. Another annular seat, axially spaced from the first, also surrounds the oxidizing-gas-passage. A pair of eccentrically arranged preheating-gas inlets are located between the two annular seats and are angularly separated from each other by laterally disposed seats. A chamber for mixed preheating gas is located between the ends of the tip and a discharge passage extending from the chamber to the outlet end. A preheating-gas mixing passage also discharges into this chamber; the inlet end of the mixing passage is spaced from the preheating-gas inlets. One preheating-gas passage connects a preheating-gas inlet to the inlet end of the mixing passage and another passage connects the other preheating-gas inlet to the inlet end of the gas mixing passage. At least one of these preheating-gas passages is inclined with respect to the mixing passage.

CORRECT PRESSURES FOR OXY-ACETYLENE OPERATIONS

AUTO-LITE PRESSURE GAUGES



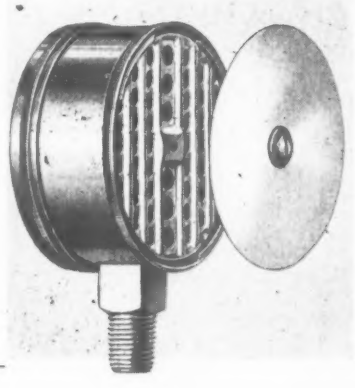
Operators who cut, treat or join metals by oxy-acetylene flame processes have the assurance and protection of proper pressures when their equipment includes Auto-Lite Pressure Gauges.

These gauges save man hours through precise pressure indication. Designed and manufactured by pioneers in the development of dial-type precision instruments, Auto-Lite Pressure Gauges are standard equipment for oxy-acetylene apparatus, and are listed as approved by Underwriters Laboratories.

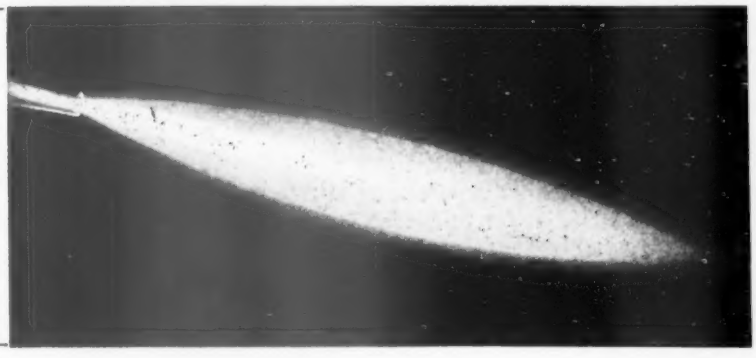
THE ELECTRIC AUTO-LITE COMPANY

INSTRUMENT AND GAUGE DIVISION

CHRYSLER BUILDING, NEW YORK 17, N. Y.

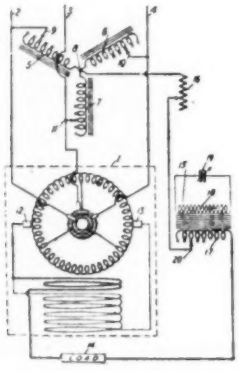


Rear view of pressure gauge shows grid-retainer plate — exclusive with AUTO-LITE gauges. This is a special safety feature which gives added protection to operator and plant equipment.



D-C Welder

2,380,668. **Montford Morrison,** Upper Montclair, N. J. Filed Dec. 23, 1943. Issued July 31, 1945.



A circuit for converting three-phase a-c power to d-c for arc welding. It includes a polyphase synchronous converter connected to a polyphase supply circuit. The circuit is shunted by a star-connected group of iron-core reactors providing a pronounced higher harmonic of voltage difference between the center connection of the star-connected reactors and the neutral voltage point of the converter. The neutral voltage point is the mid-value voltage present between commutator brushes of the converter of opposite polarity. A d-c load is connected between the center connection and one commutator brush by a load connection that includes an a-c circuit element selectively reactive to the higher harmonic.

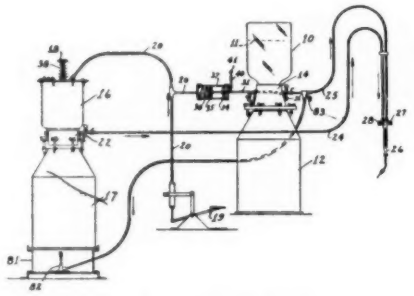
» «

X-Ray Film Holder

2,381,261. **Alvin F. Cota,** Milwaukee, assigned to **A. O. Smith Corp.,** Milwaukee. Assigned Aug. 28, 1942. Issued Aug. 7, 1945.

A film holder for X-ray films. It comprises a curved metallic shoe having a thin lead surface on the convex side to absorb stray radiation. A cassette envelope of pliable elastic rubber is secured to the shoe in a manner to create tension in the envelope and to permit its ready application and removal. A pliable folder of thin material, adapted to hold the films and shield them from light rays, is disposed for insertion in the cassette envelope. Fluorescent material provided on the inside surface of the folder is radially compressed into close contact with the film when the envelope is stretched over the shoe's convex surface, providing a sharp and distinct photographic film.

» «



Oxygen-Acetylene Generator

2,381,319. **Rodney B. Swift,** West Alexandria, O. Filed July 2, 1943. Issued Aug. 7, 1945.

This combination oxygen-acetylene generator includes: a receptacle for calcium carbide, a water receptacle beneath it, automatic feed mechanism for feeding the calcium carbide into the water under control of the pressure of the acetylene gas produced by the reaction, a receptacle for sodium peroxide, a second water receptacle beneath it, and a feed mechanism for discharging measured quantities of sodium peroxide into the water of the second receptacle. Means under the control of the pressure of the acetylene gas controls the discharge of sodium peroxide into the water of the second receptacle.

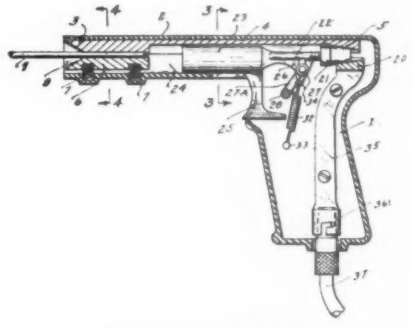
» «

Multiple Spot Welder

2,378,697. **John F. Geibel,** Buffalo, assigned to **Master Metal Products, Inc.,** Buffalo. Filed May 18, 1942. Issued June 19, 1945.

A frame having movable, electrode-supporting members between which placed the work to be welded. Electrod are applied to one member, and co panion, individually displaceable ele trodes are applied to the other membe Each displaceable electrode is connecte to a circuit-closing contact element whic is movable to and from a common conta strip. Associated with each electrod contact element is a pneumatically oper ated mechanism for actuating it to circuit closing position to complete the weldin circuit.

» «



Electrode Holder

2,378,707. **Gustave Hiller,** Vancouver, Wash. Filed Aug. 26, 1943. Issued June 19, 1945.

An energizing control for an electrode holder of the type having a body of pistol form with a two-member electrode holder at one end of the barrel and one of the latter members extending lengthwise the barrel and into the handle. The energizing control includes a guide slidable in the barrel, a switch plug carried by and movable with the guide, and spaced circuit contacts to be bridged by the switch plug when the slide is moved in one direction. One of the contacts is carried by the handle end of the electrode member, and the other is carried in the handle. A biasing spring is connected to the guide. Each of two independent mechanically operable means may be operated at will to move the guide and thereby the switch plug to a position to be held by the biasing spring to complete a circuit through the contacts. One only of these independently operable means is capable of moving the guide and switch plug to break the circuit.

» «

Multiple Spot Welding

2,378,741. **William A. Weightman,** Philadelphia, assigned to **Edward G. Budd Mfg. Co.,** Philadelphia. Filed Aug. 25, 1939, and June 18, 1942. Issued June 19, 1945.

A method of spot welding two members which have at least one reverse curve with a convex and a concave portion. The members are pressed into position with respect to each other, and a plurality of relatively closely spaced spot welds are first effected along the concave portion from the opposite side. More widely spaced spot welds are next effected along the convex portion from the opposite side. The pressure is then removed while the members are turned so that the concave and convex portions are reversed. Additional welds are then made.

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WELD CONTROL TIMERS

for All Types of Resistance Welding.

Accurate — Fool Proof — Simple — Low Priced.

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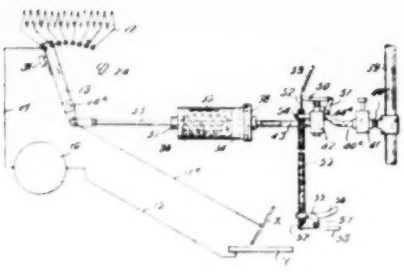

Arc-Welding Governor

2,384,618. **Edward S. Hebeler,** Williamsville, N. Y., assigned one half to **Unit Rays, Inc.,** Cleveland. Filed July 23, 1942. Issued Sept. 11, 1945.

A movable element for controlling the current in an arc welder. The means for operating and controlling the position of the element includes a housing, a diaphragm extending across it, a rod connected at one end to the diaphragm, a chamber formed between the diaphragm and a wall of the housing, a vacuum pump, a pipe connecting the pump with the chamber and a flexible tube adapted to extend from the chamber to the place of work. A valve mechanism connected to the end of the tube opposite the portion connected to the chamber permits varying the amount of vacuum created in the chamber by the pump.

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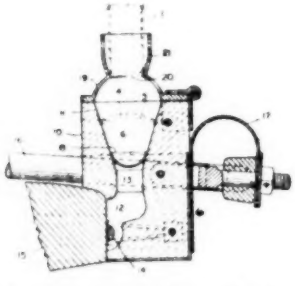


Thermit Welding Method

2,383,040. **Charles A. Cadwell,** Cleveland Heights, O., assigned to **The Electric Railway Improvement Co.,** Cleveland. Filed Dec. 4, 1943. Issued Aug. 21, 1945.

In this thermit-welding method, there is placed in the crucible a main body of material consisting of a metallic oxide intermixed with a metallic element that is capable upon being heated of reducing the oxide to produce molten metal. On top of the main body of thermit material there is a disposed a layer of metallic oxide and intermixed metallic element having a higher intensity of reaction. The amount of the metallic element in the upper layer is sufficient to reduce the intermixed oxide to metal upon ignition of the charge and thereby produce an exothermic reaction which in turn sets off the main body of thermit material.

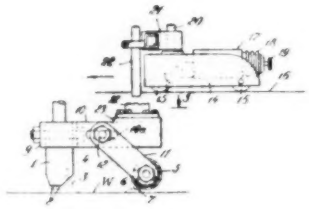
» «

Resistance-Welding Circuits

2,378,897. **Stephen L. Burgwin,** Forest Hills, Pa., assigned to **Westinghouse Electric Corp.,** East Pittsburgh. Filed Nov. 20, 1943. Issued June 26, 1945.

This combination comprises a capacitor connected in a series circuit with the transformer primary winding, means to supply direct current to charge the capacitor, means including a normally nonconductive electronic tube to form a discharge circuit across the capacitor and primary winding. An oscillating current tends to flow through the discharge circuit when the tube is conductive. A means is included for rendering the tube conductive.

» «



Flame-Hardening Apparatus

2,382,515. **Stephen Smith,** Jersey City, N. J., assigned to **Air Reduction Sales Co., Inc.,** New York City. Filed June 29, 1942. Issued Aug. 14, 1945.

Apparatus for hardening and tempering the surface of a ferrous metal workpiece by progressive heating and quenching. In addition to the means for heating the work surface above critical temperature and applying the quenching liquid, there is also a means spaced behind the quench for removing the quenching liquid before the surface is fully quenched. The distance between the places on the work surface at which the quenching liquid is applied and removed can be adjusted to vary the length of time during which the quenching liquid is effective.

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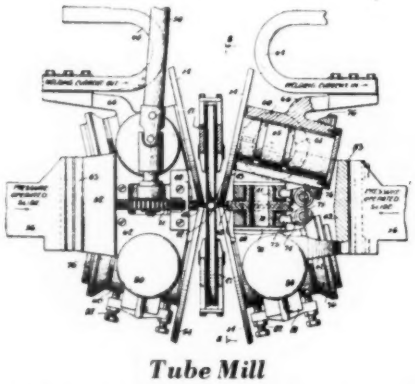

Tube Mill

2,381,742. **Howard P. Guirl,** Munster, Ind., assigned to **The Superheater Co.,** New York City. Filed Dec. 27, 1943. Issued Aug. 7, 1945.

Seam-welding apparatus for joining fins of rectangular cross-section to a heat-transfer tube. The tube and fins are guided to the welding station with the fins extending longitudinally of the tube and contacting it along their narrowest faces. A pair of rotary electrode wheels are located at the welding station at either side of the tube adjacent the path of one of the fins. A pair of spaced workfeeding and guide wheels are mounted in alignment at the welding station, each being formed to engage the outer longitudinal face of one of the pair of fins. The electrode wheels of either pair are so disposed as to engage opposite side faces of the adjacent fin close to its juncture with the tube. Also included are a means for supporting the electrode wheels out of the positions in which they contact the fins and a means for moving them into contact with the side faces of the fins. The latter means is responsive to the engagement of the feed wheels with the longitudinal faces of the fins.

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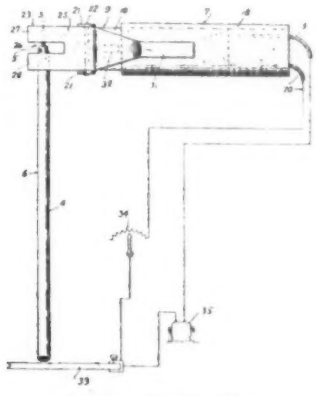

Electrode Holder

2,379,777. **Maurice L. Zeilstra,** Richmond, Calif. Filed Oct. 12, 1943. Issued July 3, 1945.

A holder for a bipolar electrode. It comprises first and second elongated members. First member has a handle on one end and a pair of contact-carrying jaws at the other end with contacts insulated from each other. Second elongated member is pivoted intermediate its ends to the intermediate portion of the first elongated member; the second member has a thumb piece disposed beside the handle and a pair of contact-carrying jaws with contacts insulated from each other. One contact of the first member coöperates with one contact of the second member to grip one conductor of the electrode; the other contact of the first member coacts with the other contact of the second member to grip the other conductor of the electrode. A spring acting on the second member swings it in a direction causing the contacts to grip the conductors.

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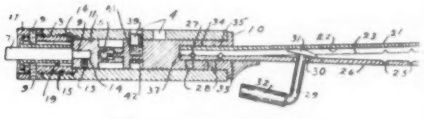

Electrode Holder

2,379,515. **Michael Gallo,** Baltimore Filed June 5, 1943. Issued July 3, 1945.

The handle of this electrode holder has a passage in which a conducting jaw unit is inserted. The latter is provided with a front kick plate mounted to butt against and cover the front of the handle and with an extension lip for reinforcing the support of the jaws. A pair of jaw members are securely held within the jaw unit

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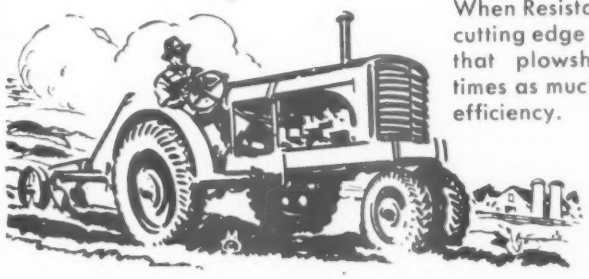

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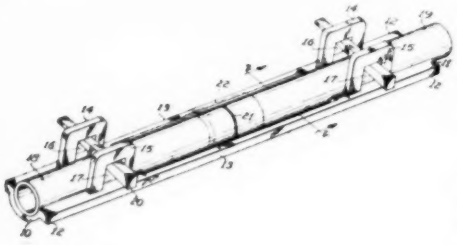
Pipe Jig

2,381,584. **Lee W. Fulleton,** Portland, Ore. Filed April 10, 1943. Issued Aug. 7, 1945.



A welding holder for supporting a pair of pipes in axial alignment during a welding operation. The holder comprises an elongated body having a longitudinal groove for accommodating the pipes and a pair of flanges extending on opposite sides of the groove and lying in a plane parallel to the common axis of the pipes when they are properly positioned. A cutout section in the center of the elongated body extends from one flange to the other and causes the flanges to be reduced at the cutout to parallel bars spaced from the surface of the pipes. Welding may thus be performed entirely around the pipes at the cutout section. Near each end of the elongated body is a pair of upwardly extending ears; the ears of each pair are located on opposite sides of the groove and in transverse alignment with each other. A wedge member adapted to extend transversely through each pair of ears enables the pipes to be clamped in position in the holder.

Section for Welded Connections

2,382,583. **Emanuel Scheyer,** New York City. Filed Sept. 16, 1943. Issued Aug. 14, 1945.

A T-shaped structural section for flexible welded connections. The head of the T has one of its surfaces depressed along a line adjacent to the stem, materially weakening in bending along the line that portion of the head. The surfaces of the head on the side from which the stem projects, extending at right angles to the adjacent surface of the stem, are depressed along the previously mentioned line of depression.

Welded Structural Connection

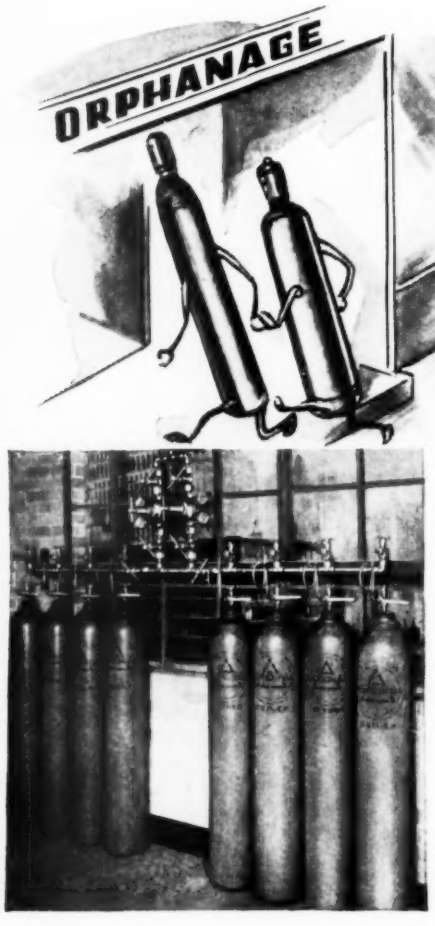
2,382,584. **Emanuel Scheyer,** New York City. Filed April 12, 1944. Issued Aug. 14, 1945.

A welded shear connection between two structural members, one being a horizontal beam with a vertical web and the other a member with a substantially vertical portion to which the beam is connected. The connection, a vertically extending piece between the beam and the vertical portion of the second member, is welded to each member.

Patents Available for Licensing or Sale

2,304,975. **Brazing or Welding Tongs.** Issued Dec. 15, 1942. A portable device of plier-like form having interchangeable electrodes for brazing or welding. It is particularly adapted for use on light work which may be more or less inaccessible or of a character not easily handled by conventional equipment. The tongs are so formed as to permit circulation of a cooling agent through them. (Owner) **Ralph Warrender,** 509 Hull St., Sharon, Pa.

2,363,007. **Equipment for Cutting Circles in Metal Sheets or Plates.** Issued Nov. 21, 1944. A supporting means having tracks for reciprocatory movement of a torch carriage is pivotally mounted on a single vertical upright which permits swinging movement relative to a conventional turntable, preferably the turntable of a "welding manipulator." An electromagnetic radius-rod-centering device permits circular cutting without centering indentations. (Owners) **William H. Kohlhafer** and **Frank J. Olenik,** David Taylor Model Basin, Washington 7, D. C.



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